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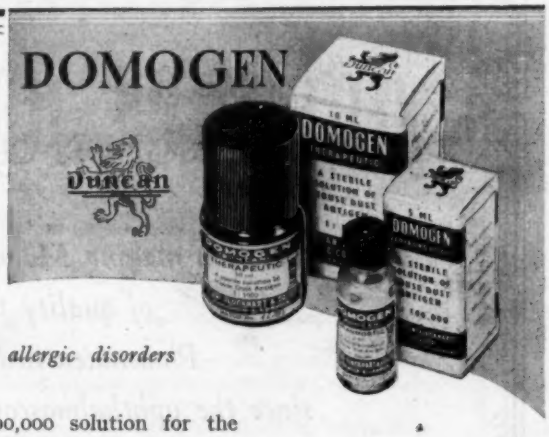

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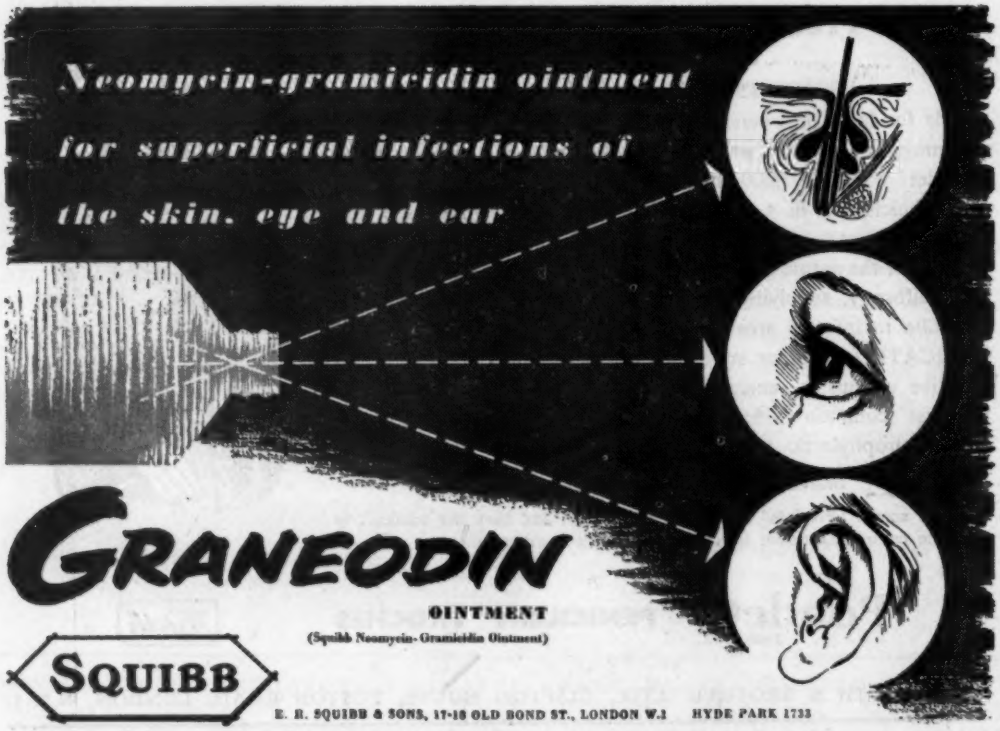

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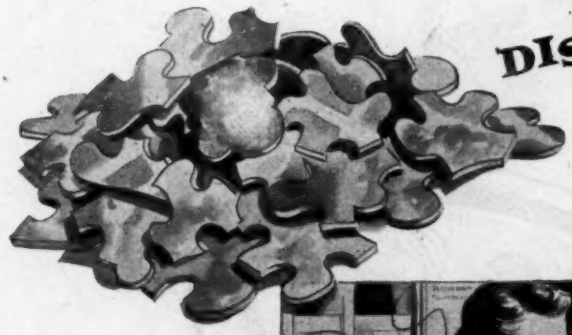

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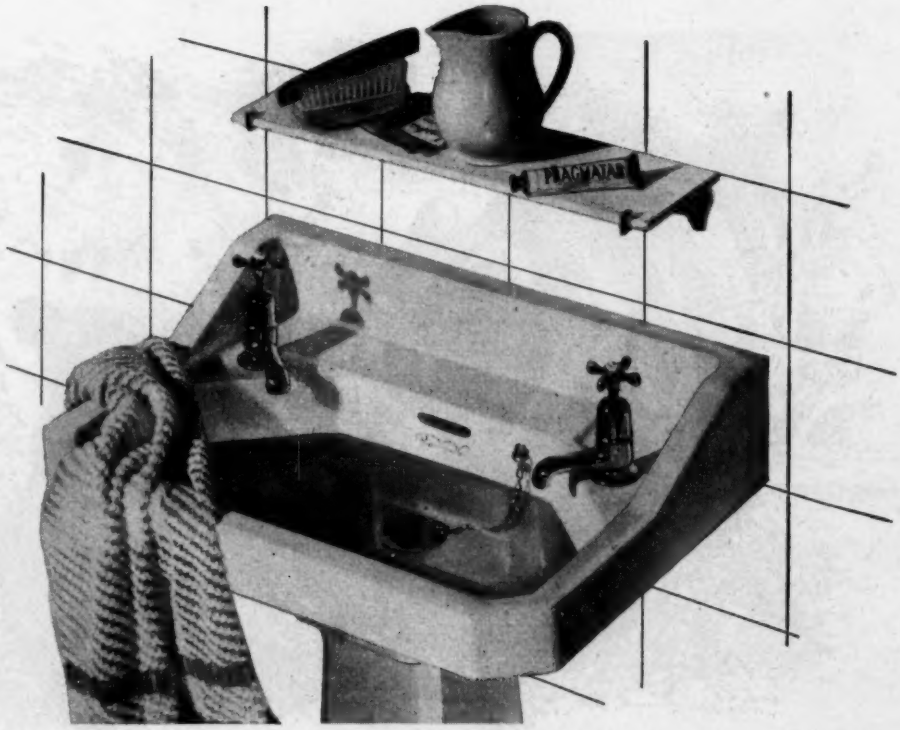

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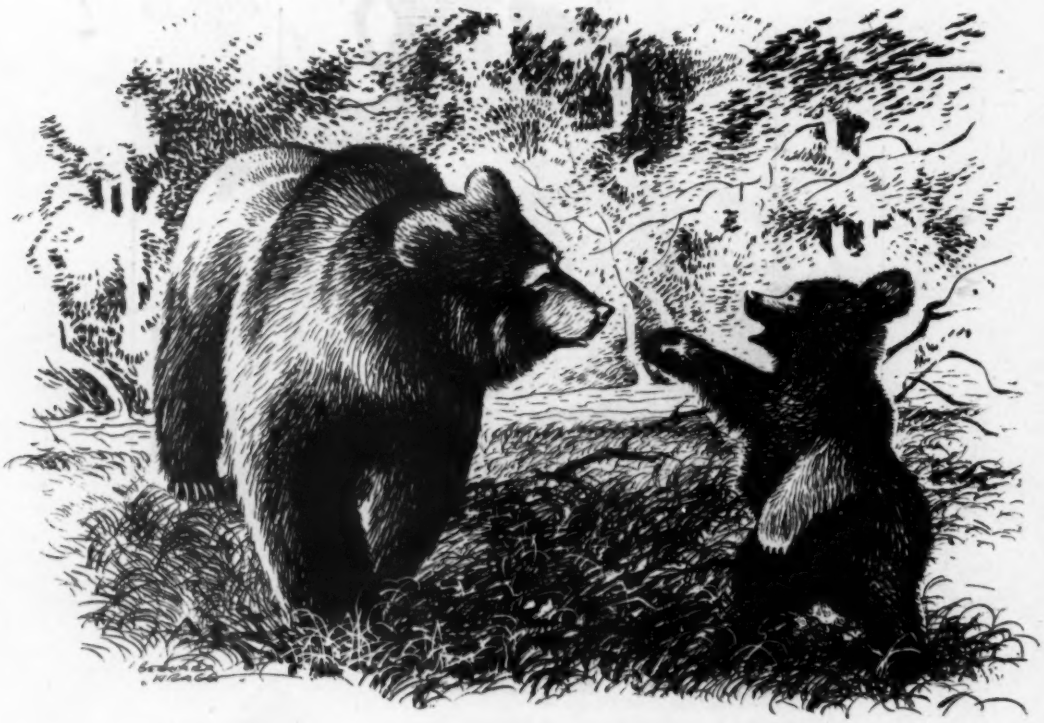

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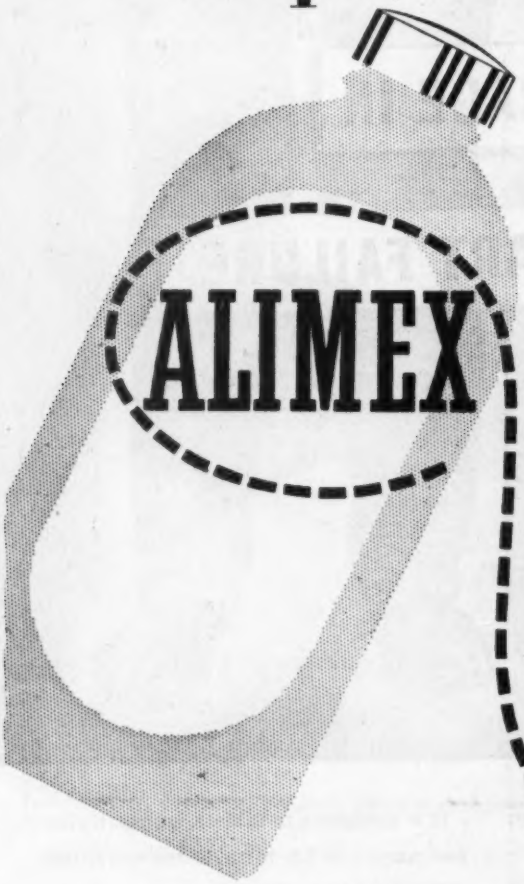

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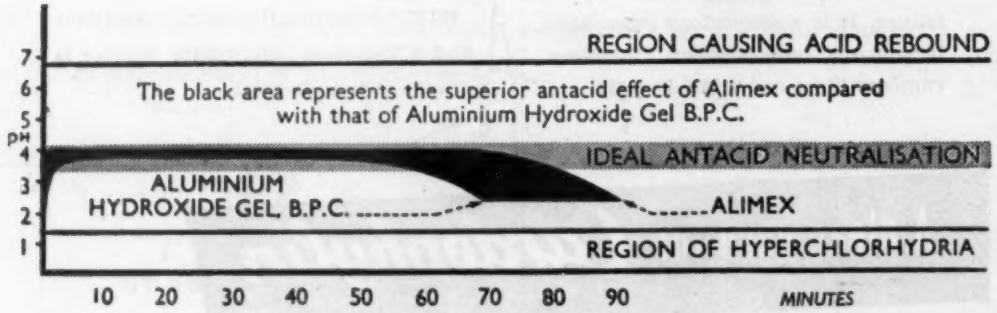

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Ferrous Gluconate is the bivalent iron salt which is best utilised and tolerated by the body, rendering possible intensive and protracted ORAL treatment in the most fastidious patients.

References

Helv. med. acta, 1949, 16, 67
Schweiz. med. Wschr., 1949, 79, 1255
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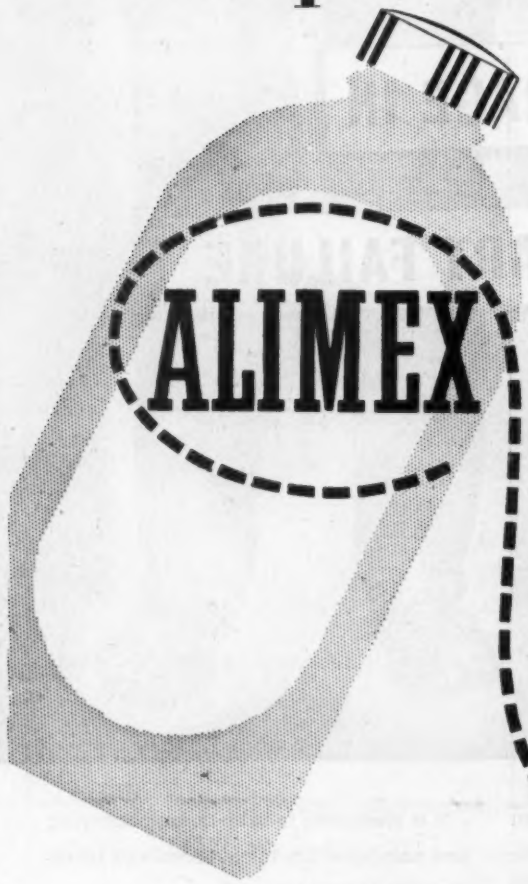

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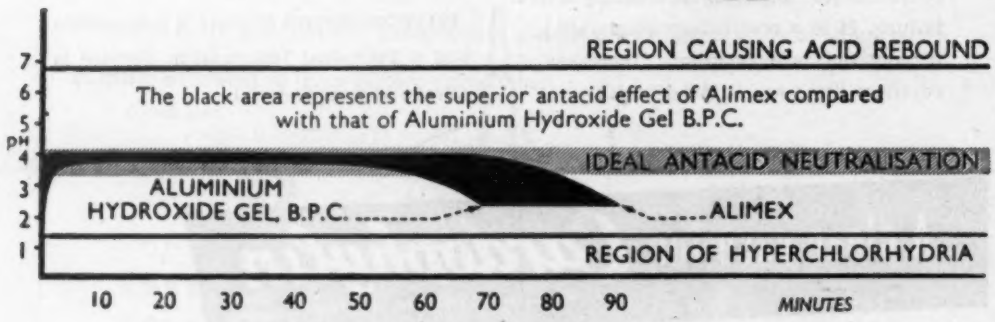

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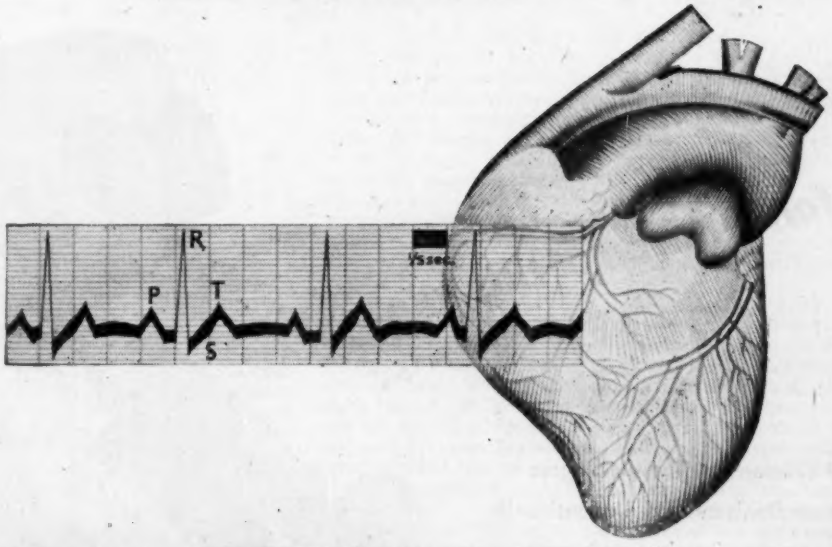

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OLD THOUGHTS AND NEW WORK ON BREADS WHITE AND BROWN *

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E. M. WIDDOWSON
D.Sc., Ph.D. Lond.

From the Medical Research Council Department of Experimental Medicine, University of Cambridge

THE title of this lecture carries two ideas, and the lecture really has two parts. The "new work" deals with some of the experiments which we made in Germany and England between 1947 and 1951. This work concerned the nutritive value of white and brown bread. We got results which surprised us very much at the time for, in spite of everything we had been led to believe for the last thirty years, white turned out to be just as good as brown, and all kinds of wheaten bread to have a nutritional value far in excess of anything we had been led to suppose. It seemed fairly clear, however, after a few more experiments, why we had got the results. The real and still outstanding problem was why they had been so unexpected, and this we set out to solve. We started, naturally, with the most recent literature, but we soon found ourselves involved in a tangled skein of social and economic history with threads that reached back to the very beginning of things. These are the "old thoughts."

So we worked backwards as it were, starting from our own work and going further and further into the past, but we shall tell you the story in its proper sequence today, starting from the very early days and ending with our own work. History is not so exciting as detective fiction—but it is usually more logical and easier to follow.

Early Mediterranean Civilisations

Men began to cook cereals long before they made bread. Some form of porridge was probably the first development, and many African tribes are still in this stage of cultural development. The history of bread, certainly of fermented bread or yeast bread, begins with the cultivation of wheat, for barley, which probably preceded wheat as the cereal for human consumption, will not "rise" and therefore cannot be made into good loaf bread. It was probably eaten as porridge or as flat unleavened cakes, much as oatmeal is eaten today. It is not known when men found out how to make their bread whiter and improve the baking qualities of their wheaten meal by taking the bran out of it, but there is a wall picture at Thebes of ancient Egyptians sieving off the bran, and we believe the meshes of the sieves were made of interlacing papyrus grass or rushes. In Pliny's time the Gauls used horsehair, and the Iberians flax. The product of this separation was the "fine flour" often referred to in the Bible as suitable for offerings or special occasions. "He shall bring for his offering the tenth part of an ephah of fine flour." (*Leviticus*, 5, 11.)

We do not know how the ancient Egyptians regarded their brown and white breads, but we know pretty well what the Greeks and Romans thought about them, for there are plenty of quips at their expense in the comedies and satires, and discussions of their respective merits in the more serious literature. There were at least four grades of flour. The finest kind was expensive, a really luxus food, for it could only be made from the best wheat, sieving cost money, and the final product was only some two-thirds of the original purchase. Then came a somewhat lower grade which was referred to as "seconds," then a wholemeal product, and finally a very coarse variety, sometimes a mixture of wholemeal and bran and sometimes just a collection of branny residues, mixed perhaps with beans. In Athens, however, white wheaten bread was by no means confined to the houses of the idle rich. It was a food the theatre-going public knew all about, liked, demanded, and ate if they could afford it. There is a revealing little fragment from Antiphanes (Athenæus *c.* 200) which makes one think of the 'Bisto' advertisements. Someone had evidently been told to clear off a baker's premises and he replied: "How could any gentleman go away when he sees those rows of lovely white loaves filling the oven?" At the same time white bread in Roman times was certainly one of the class distinctions—as everything which is rationed by price has always tended to be—and black bread was the food of the slaves and the down-and-outs. There was often a contemptuous ring about the term "black bread." A character in a comedy of Plautus (*c.* 200 B.C.) says to the mother of one of his mistresses "Before I courted that girl of yours and offered her my loving heart you used to live on black bread in rags and poverty—and were glad to have the bread and rags."

Nevertheless, it must not be supposed that no-one had a good word for dark bread. The drift to the towns was a worry to the Romans, and at times to the Athenians; and in the eyes of some, white bread stood for city life and sophistication. Wholemeal bread was the countryman's fare. It put strength into you—*et vires facet*. It became a symbol to some people of the good old days, the simple life of long ago when men were always fit and strong, and in Plato's (*c.* 400 B.C.) build-up of the ideal State there came a time when he pictured men as living into healthy old age on wholemeal bread ground from a local wheat. Socrates put the other point of view very aptly in his reply by suggesting that this proposal meant that the whole population would be living on pig-food. To identify wholemeal bread with health and strength and the good old days was psychological symbolism, for there was of course no experimental evidence or vital statistics to show that any of it was true, and the medical opinions were rather the reverse. The Hippocratic school were well aware that bran in the bread increased the bulk of the fæces; "wholemeal bread clears out the gut and passes through as excrement, white bread is more nutritious; it makes less fæces." (Hippocrates 430 B.C.) Galen (*c.* 160) rated the nutritive value of the four kinds of bread as varying inversely with the amount of bran in them because, in his opinion, the greater the bulk of stools made by a given amount of bread the less nutritious that bread was likely to be. These were shrewd observations to have been made two thousand years ago.

Medieval and Early Modern England (1200-1700)

It may seem a far cry from classical Rome to medieval England, and in some ways it is; but human nature had not changed, so why should people's feelings about white and brown bread? The millers, however, now began to come into the picture and they ultimately became an important group. The mills were driven by water power rather than by slave labour, and medieval practice laid it down that all grain to be ground had to be taken to the manorial mill and the millers were paid—not in cash but in kind. The same principles applied in a lesser degree to bakers. This led to endless trouble and the miller was always suspected of sharp practice. Chaucer represented both his millers as dishonest men,

* This article forms the substance of the Sanderson-Wells lecture which was delivered by R. A. McCance on June 14, 1955; it is itself a résumé of a detailed study of the subject, which will be published by Pitman Medical Publishing Co. Ltd.

and millers and bakers were generally regarded with great distrust.

> "For which this miller stal both mele and corn
> An hundred tyme more than biforn;
> For ther-biforn he stal but curteisly,
> But now he was a theef outrageously."
>
> (Chaucer 1388.)

The English climate was not that of the Mediterranean basin. Wheat could only be harvested successfully in the south and east of England, and barley, rye, and oats were widely grown, and used extensively for human consumption. Wheat, however, was always the cereal of choice and, as in Rome and Athens, people who could afford it liked the soft bread and the good baking qualities which only white wheaten flour could provide.

There were various grades of wheaten bread. The finest wheat was often baked into small rolls termed manchets. In the Percy's Yorkshire household in 1512 "My Lord and Lady" each had "a manchet for breakfast." (*Regulations* 1770.) The larger white loaves in medieval times were termed wastel bread or pain de maigne (demesne bread, panis dominicus, monk's bread, &c.). The coarser breads were referred to as cheat breads or ravelled cheats, and the price of the three standard grades, white, wheaten, and household were regulated by the "Assize of bread."

We know a good deal of what people thought and did about white and brown bread in medieval and later times, for there are plenty of references to them in the writings of the day. In times of dearth, for instance, Piers Plowman could only afford an oatcake and 2 loaves of beans and bran for his children whereas when plenty came

> "No no beggar ete bred that benes inne were,
> But of coket or clerematyn, or elles of clene whete."
>
> (Langland 1377.)

White bread was a treat, as we know from the Nursery Rhyme

> "Ride a cock horse
> To Coventry Cross
> To see what Tommy can buy
> A penny white loaf,
> A penny white cake,
> And a two penny apple pie."
>
> (Percy Society 1841.)

And brown bread carried just the same social stigma as it did in Greece and Rome. "The Duke would eat mutton on Fridays. He's now past it; yet and I say to thee, he would mouth with a beggar, although she smelt brown bread and garlic." (Shakespeare 1604.)

Medical opinion as to the nutritional value of the different kinds of bread was much the same as it had been in classical times because physicians were still in the main quoting Hippocrates and Galen rather than making their own observations, but the public now recognised the laxative properties of bran. Some regarded it as a worthless impurity "Asses, fools, dolts! chaff and bran, chaff and bran!" (Shakespeare 1609.) Others had a high opinion of brown bread because of it. Brown bread relieved constipation; it was the bread for the strong. White bread was overnourishing and made people fat. Tryon (1683) wrote with deep psychological feeling about the matter. It was wrong for anyone who set any store on Health or Nature to separate the bran from the finest flour. Nature required both to nourish the body and to cleanse the system. Only by eating both in their natural proportions could a man be strong. The trick of separation

> "was first invented to gratifie *Wanton* and *Luxurious* Persons. . . . If we look into the *Country* where the *Pheasant*, that has no better than *course Bread*, and other hard and mean fare, is healthier, stronger and more agile and sprightly than the *City-Cormorant* whose brutish Appetite cannot be satisfied with any other thing than the costliest and richest Varieties that Nature can afford."

Tryon in short was advocating wholemeal bread because (*a*) it was laxative, (*b*) it was a natural food, (*c*) eating it would promote health and strength. This is clearly the appeal which Stubs had voiced nearly a hundred years before. "Doe we not see the poore man that eateth browne bread . . . healthfuller, stronger, fayrer complectioned, and longer living than the other, that fare daintelie every day." (Stubs 1585.) Reference has already been made to the expression of similar sentiments in the classical literature.

The Eighteenth Century (1700-1820)

These years witnessed great changes in the social structure of Britain, and by their close England had been transformed from a collection of rural communities living in a comparatively well-wooded island to a country of organised industry based upon coal. Technical improvements revolutionised the milling industry, transportation, and the productive capacity of the land. At the beginning of the century the millers were still the mistrusted servants of the bakers and the public. These relationships died hard, but by 1820 the mills had become a mass of machinery and the miller had taken over the task of separating the bran, which hitherto in history had tended to be the responsibility of the baker or the domestic user of the meal. The population increased rapidly, but the extensions and improvements in farming more than kept pace with it, and the acreage under wheat increased so much in southern England that in many years there was a surplus for export abroad or to other parts of the country where wheat could not be grown.

In spite of these sweeping changes in the material things of life there was really no new alignment in men's attitude towards white and brown bread. White continued to be the delicacy to be offered to a distinguished guest, just as it had been in the time of Abraham (*Genesis*, **18**, 6).

> "I'll have none of your nasty beef,
> Nor I'll have none of your barley;
> But I'll have some of your very best flour
> To make a white cake for my Charley.
>
> (Jacobite song 1748, see Thomas 1930.)

During the prosperous fifty years at the opening of the 18th century the labouring classes in the south and east ceased to think of white bread as a luxury and began to regard it as one of the necessities of life. They clung obstinately to this point of view in spite of the price of white bread during the series of bad harvests and economic misery of the latter part of the century. They refused to accept potatoes as the people in Ireland, Lancashire, and the North had done, or to go back to wholemeal and barley bread, and established their right to have white bread after a bitter struggle in which many harsh and unkind words were spoken and written by both sides.

In the 18th century meal was still being bolted at home, but by its close the millers were quite prepared to produce a white flour for any customers who could pay for it; they got a better price for it than for wholemeal, and over and above that were able to dispose of the offals to the manufacturers of ship's biscuits and to horse owners. England was so far forward industrially in the 18th century that the evolution in social relationships and cereal economy which took place at that time did not begin to gather momentum in some European countries for another hundred and fifty to two hundred years (League of Nations 1939).

Although the foundations of scientific medicine had been well and truly laid by the early 19th century, the application of scientific thought to food had not yet begun to have much effect on medical opinion, and the views of the physicians of the day were still those of

Galen and Hippocrates. Wholemeal bread, however, continued to be advocated by middle-class dreamers and townsmen, who regarded it, consciously or unconsciously, as a symbol of what they supposed to be the healthy, unconstipated life of the countryman and the days of long ago. "Great numbers of our fellow subjects eat their bread much coarser than the Londoners: are they weaker? They are generally stronger. Some part of the advantage must be carried to this account." (Advocate for Trade 1773.)

Peace and Plenty (1820-1914)

There were outstanding developments in the milling industry during this century and the impact of science began to make itself felt on nutritional thought, but the public demand for a white loaf continued without intermission. It did so for the same reasons as before, in spite of the unscrupulous adulterations and other devices to which the millers and bakers had to resort in order to meet competition within the trade and produce a white loaf which their customers could afford to buy. The millers and bakers came in for a great deal of criticism for these practices between 1800 and 1850, and their reputation fell to a very low level once more, but the whole economic structure of the trade and its relations with the public changed about 1860, for by that time the sale of offals and residues had become profitable enough to allow the millers to reduce the price of white flour below that of brown. Employers and others could no longer make out a case that their employees were living on food which was beyond their legitimate means, for white bread had now become the cheapest food the poor could buy, and in the industrial cities they were in fact subsisting largely upon it. The introduction soon afterwards of the roller mill and silk bolting sieves enabled the millers to effect a much more perfect separation of the offals, particularly of the germ and scutellum, from the product sold as white flour. This made the latter look whiter still and improved its keeping qualities. It also improved the value of the offals. These changes were welcomed by the public and the stock-breeders, and the millers naturally coöperated because they found their turnover and profits increased thereby. So everyone, or nearly everyone, was happy. Millers and public were now at one, strongly supported by the animal husbandmen, and these three strong pressure-groups came together in favour of white flour.

While all this was going on the old idea of wholemeal bread as a symbol of all that was "natural," "vital," and good spread widely among certain of the intelligentsia under the teachings of men like Sylvester Graham and Allinson. Both were vegetarians, and Allinson was also a teetotaller. They were both deeply sincere and they achieved great reputations and a considerable following. Graham bread is still the term for wholemeal bread in the United States, and there is still a steady sale in parts of England for the wholemeal bread baked from Allinson's stone-ground flour. These men's belief that wholemeal bread was the natural and therefore proper food for man amounted almost to a religion. Graham frankly considered that in separating the bran from the endosperm man was tearing asunder what God had joined together in the grain. "It is for a wise purpose that the Deity has so intimately associated in the grain, the several substances which are necessary for the complete nutrition of animal bodies." (Graham 1837.) Allinson (1885) preached that brown bread was the true staff of life; children brought up on it would have strong frames and good health and be able to fight their way (unconstipated) through the world, free from the craving for beer and spirits. A Bread and Food Reform League was established which helped to spread the gospel. This body was responsible for the introduction of "standard bread" in 1909; its sponsors attributed its valuable properties, not so much to the amount of bran it contained, which was small, but to the vital and mysterious germ. This bread achieved considerable ephemeral reputation thanks to the activities of the *Daily Mail*. Graham, Allinson, and their adherents formed a small but sometimes vociferous group which maintained pressure and educated opinion in favour of brown bread.

Chemical analysis in the early part of the 19th century showed that, although wholemeal flour contained more indigestible cellulose, it also contained more protein, fat, and minerals than white flour, and chemists like Liebig considered that weight for weight it was more nutritious. The "balance" experiments, however, which were carried out by the more biologically minded scientists in the latter part of this period all showed (what in fact Hippocrates had stated two thousand years before) that the indigestible nature of the branny parts so increased the losses of nutrients in the stools that weight for weight the chemical advantages were more than counterbalanced by the physiological drawbacks. The scientists, therefore, constituted a relatively neutral group, although their discoveries were made use of by the protagonists both of white and brown. The work on vitamins which was destined to exert such an influence in the next forty years, came too late to make much impression in this period.

Shortages and War (1914-1921)

There was nothing new in a grain shortage, or in its effects, and when the submarine campaign prevented the normal quantities of wheat entering Britain the reactions both local and general were very similar to those during the series of bad harvests at the close of the 18th century. The King issued a similar proclamation, for instance, to that issued by George III in 1800, and the Government and its spokesmen made similar exhortations to economise bread. Workers liked their beer in 1917 just as they did in 1800, and at neither time did they welcome the idea of having it watered down in order that the barley grown for brewing it should be put into bread. Nevertheless, on the advice of the Royal Society Parliament ultimately ordered the millers to raise the extraction-rate of wheat to 90% and to incorporate 20% of other cereals, barley among them, in the flour sold for bread-making. During the long period of plenty and industrial development before the war milling and baking had become large-scale standardised processes, and it was much more difficult to conform with these orders successfully than it would have been for the small private concerns in previous centuries. The public had also become accustomed to the standardised products and liked them. Consequently the millers and bakers disliked these orders, for, apart from reducing their turnovers, they created real difficulties in the production of good bread. The public on the whole found the bread unpalatable, partly because its members were not accustomed to it, partly because it was often bad bread, and finally because it had to be kept for at least twelve hours before it was sold. Incidentally, this order was another echo from the 18th century. An attempt was made by the authorities to reduce the number of animals, such as pigs and poultry, which competed with man for cereal foods, but bread was never rationed as it was in France, and an attempt was made to keep its price within the reach of all. In spite of the advantages of the last two achievements the more irresponsible and unpatriotic of the groups who favoured milling to 70% extraction and the consumption of white bread lost no opportunity of voicing their feelings. People attributed their indigestion and other complaints, real and imaginary, possible and impossible, to the bread, but no experimental support could be found for their ideas. The millers' advocates criticised the reports of the Royal

Society most polemically, and the animal husbandmen reacted in a similar way.

The group of people traditionally in favour of wholemeal bread welcomed the higher extraction-rate with satisfaction, and the parliamentary secretary to what later became the Ministry of Food put their point of view clearly at a meeting of the Royal Society of Arts.

"We should be careful how we interfered with any of nature's gifts and thereby destroyed her provision . . . such as prevailed in the production of white bread. War bread was almost a complete human food and when combined with either butter or margarine was in fact a complete human food. . . . We had attained a bread which passed muster with our chief scientific critics." (Bathurst 1917.)

The last was true. The evidence about vitamins which was now accumulating pointed to the fact that there was something nutritionally very important in the outer layers of the wheat berry. The exigencies of the war and the scientific work before and during it had made disinterested men like Hopkins and McCarrison think about bread in all its nutritional aspects, and they probably felt relieved to see the extraction-rate going up. When the war ended and there were prospects of a return to white bread some people began to wonder if this would be a good thing for the health of the country:

"We deprecate the use of the phrase 'better bread' to describe the return to whiter flour. Those with a taste for such bread may consider it nicer but it is elevating personal predilection on a pedestal to make it the standard of goodness. It would be better to continue to extract 80 per cent or more from wheat for the use of man . . ." (*Lancet* 1918.)

Return to Plenty (1921-1939)

The return to free milling and white bread after the war satisfied the millers, the bakers, and on the whole the public, but the rising standards of living were reducing the consumption of bread and the millers realised that efforts would have to be made to maintain and if possible increase the amount of wheat milled for human consumption. This made the trade a firm pressure-group in favour of white flour, and as before the pressure was supported by the stock-breeders and by the majority of the general public.

Scientific results rapidly accumulated to show that, under chosen conditions, wholemeal flour was a better food than white for pigeons and for growing rats and mice. Vitamin B_1 and protein were thought to be the important ingredients. Many people assumed without question that these results would also apply to British and American men and women living on their customary diets, and they were supported in this by the experience of the British recruiting boards during the war with men who had been reared for at least two generations on roller-milled white flour; for the boards had found that the nation was not the fit one which many had supposed, and that the physique and health of those presenting themselves for the Army, particularly in certain areas, was bad. Those in favour of high extraction therefore came to include, not only the food reformers and Nature-worshippers, but all those people who were interested in improving national health, and scientists of the highest calibre were numbered among them. The majority of the people in these pressure-groups had not been trained in scientific methods although they now looked to science to further their cause. This fusion of interests was unfortunate, for the enthusiasm of the non-scientific members of the groups tended inevitably to modify the outlook and to blunt the keen critical judgment of even the best scientists in them. The following quotation from a scientific journal is a good example of this: "The peasants maintain a degree of health unknown to their wealthier lords living upon refined foods." (Moore and Brodie 1925.) Furthermore, relatively untrained scientists began to take part in these "bread" experiments, both on rats and children. These experiments always seemed to give a result in favour of brown bread, and although many of them were weak both in design and execution, very few people had the temerity to say so, and when they did nobody took much notice. Consequently the build-up of evidence that the proteins and vitamins of brown bread were almost a necessary adjunct to a diet continued unchecked.

The millers' advocates were mostly connected with the industry and their papers and articles were not based upon original scientific work. Consequently, they convinced nobody outside the trade that white bread was as good an ingredient of British and American diets as brown, and in the end the millers were sufficiently impressed by the strength of the evidence accumulating against them to offer to fortify white flour with synthetic vitamin B_1. This was a very clever move. It disarmed a certain number of their scientific opponents completely, although, naturally enough, it only stiffened the resistance of those to whom wholemeal bread had a symbolic appeal.

The Second War

The groups were now lined up for the struggle which was to take place over bread policy in Britain and other countries in the ensuing years. Anyone with a knowledge of history might have foreseen that there was likely to be a shortage of wheat in Britain and that steps should be taken from the first to meet it. The Government, however, held a small stock of wheat when the war opened, and the shipping position was not immediately urgent. The Ministry of Food accordingly introduced no change of policy till 1940 and then proposed to fortify white flour with vitamin B_1. This was a triumph for the Millers' Advertising Committee, but it was not a very realistic policy. The scientists, moreover, were mostly against it because they had now convinced themselves that so many nutritional advantages would accrue from raising the extraction-rate to around 85% that the restoration of aneurin to white flour was a most unsatisfactory substitute. The Medical Research Council Accessory Food Factors Committee (1940) recommended accordingly that "the percentage extracted should be at least 80 to 85%," and the members of the Food Education Society, which was the direct descendant of the old Bread and Food Reform League, were ready to support any policy which meant a return to what they believed Nature had intended people to eat. They were at one, therefore, with the scientists in wishing to see a return to long extraction flour, if possible, however, ground between stones! They foresaw that they might find a new ally in the war-time pressure on shipping space.

Owing to delays of one kind and another the policy to fortify white flour with vitamin B_1 was only partially implemented and an "optional" 85% flour was introduced. This vacillation and indecision gave everyone a chance to come out in his true colours, and the controversy which ensued over the advantages of raising the extraction-rate was most illuminating. Private individuals, members of Parliament, journalists, investigators, and scientists all did what they could by speeches, letters, articles, and experimental work to bring out the value of the step which they themselves favoured. In March, 1942, the shipping position forced the Government to raise the extraction-rate to 85%. The war was fought on bread made from this meal, and during the war the national health improved.

At the end of 1944 the extraction-rate was reduced to 80% and this gave rise to further polemics and controversy. The millers and bakers pressed for a further reduction and offered to make good the nutritional shortcomings of the flour brought about by lowering the extraction-rate by adding minerals and synthetic vitamins. The groups in favour of high extraction reacted strongly against (*a*) any reduction at all, (*b*) the principle of allowing nutritional shortcomings caused by such reductions

to be made good by the subsequent additions of minerals or synthetic vitamins. Their argument was that, since nobody knew *all* the good things that were lost in the milling of white flour, no-one could guarantee to put them back. The controversy, which had never really died down, once more became intense. Some people expressed themselves strongly. "The public eats with its palate—not its brain—and the palate likes the taste of what the dietitians tell us is the inferior white bread." (*Milling* 1944.) "There has been a suspicion in more than one quarter that the interests of the millers have been allowed to stand in the way of the nation's health." (*British Medical Journal* 1942.) The two debates in the House of Lords were illuminating, although they were of course couched in the most dignified language "There is another and more general effect of this national wheat-meal bread upon the country as a whole, and that is that the country is much less constipated." (Lord Horder 1945.) "Is it not justifiable to think how dangerous it must be to interfere with Nature's products in the shape of the grain?" (Lord Teviot 1945.) A conference was convened by the Ministry of Food on the post-war loaf, and its report was published in 1945:

"There is a strong *prima facie* case for thinking that the vitamins in the wheat berry exist in the form of a balance which has been proved to be conducive to health, and therefore much caution is called for before starting upon a new line of action which might upset the balance with deleterious effects." (Ministry of Food 1945)—but might equally well have been (Graham 1837) or (Tryon 1683).

It is rather important to realise that the whole issue had now changed. It was no longer whether high-extraction flour was better than white—nobody questioned that—but whether white flour enriched with B vitamins and iron was as good as the natural 80% or 85% extraction flour.

Progress by Experiment

We were working on undernutrition in Wuppertal-Elberfeld in 1946. It was obvious that a good experiment might go a long way towards settling the controversy about whether or not it was wise to reduce the extraction-rate. There was a children's home in Duisburg with about 150 hungry children in it, and accordingly we arranged with the authorities that we might carry out nutritional experiments there. The original proposal was to compare the nutritional value of an 85% wheaten meal with a white flour which had been enriched with aneurin, riboflavin, nicotinic acid, and iron to the levels found in such a meal. Had we only done that we would not have had much of a story today, but in order to measure the full extent of the benefit which we never doubted would come from raising the extraction-rate from 70 to 85%, we decided to include unenriched 70%-extraction flour in our tests, and as a final thought a wholemeal flour and a 70% flour enriched to wholemeal levels were also used.

This work of ours has all been published (Widdowson and McCance 1954) and the details would be quite out of place here. It is only necessary to say that the children had been undernourished for some time. Their diets were short of calories; their ration of milk (mostly skimmed) was somewhere around 100 ml. per day, and their total intake of animal protein was only some 8 g. per day. We took away their German ration of bread and gave them unlimited amounts of one or other of our breads, and this meant that about 75% of their total calories was coming from one of the experimental breads. Most of the remaining 25% was coming from potatoes and vegetables. As the objects of the experiments were limited to finding out whether the proteins, iron, B vitamins, and possibly unknown substances supplied by the five breads met the requirements of the children equally well, we supplemented the diets with fat-soluble vitamins, ascorbic acid, and calcium.

We made two outstanding observations. The first was that the children grew and improved equally well on *all* the breads. Not only were the enriched 70% as good as the high-extraction flours they were meant to imitate, but the unenriched 70% was equally good. We confirmed these results under more exacting conditions at another children's home, and we were forced to accept them. The second observation was that the children did extraordinarily well on all the diets. They grew throughout the year of test at a rate considerably greater than well-nourished English or American children would have done. This was because they started the year under the height and weight to be expected from their age. They were "making up for lost time," so to speak. It had never occurred to us that children could do so well on diets containing so much bread and so little milk, meat, fish, or cheese, and we decided to test the diets further by adding a milk supplement, for milk had been shown to improve the growth rate of children so many times that it had come to be regarded as a *sine qua non* of all good diets. Accordingly, we regrouped the children at the end of the first year, divided them into two lots, gave them all the same kind of bread, still in unlimited amounts, and added one pint of milk per day to the diet of the first lot and an equi-calorific supplement of biscuits and orange-juice to that of the second. The milk made no difference. The children with or without it continued to grow at the same highly satisfactory rate as before until the experiment came to an end six months later.

These observations made us think. Our first reaction was to check back on some of the experiments on rats, particularly those made by Dr. Chick during the war (Chick 1940, 1942) upon which so much importance had been placed in England by the high-extraction enthusiasts. We did so by giving weanling rats diets similar to those used at the children's homes, and to our satisfaction we obtained results very similar to those of Dr. Chick. Wholemeal flour gave better growth than white. We could only obtain this difference, however, with weanling rats. When we started with rats a few weeks older we found that white and brown flours gave equally good growth, whether the young rats were undernourished (like the German children) or well nourished (like British children) when the tests began. We found also that imitations of the children's diets gave equally good growth in pigs, whatever the nature of the flour. Unlike the children, however, none of the animals grew as well on these diets as they did on the stock diets. We think this was because the experimental diets did not contain a high enough protein-calorie ratio for growing rats and pigs. These were just the conditions likely to bring out differences in the quality of the proteins provided by the various flours, and we must conclude that they were small. Differences in the total amounts of protein provided by the different flours were scarcely large enough to be detected by the means at our disposal.

We have naturally re-examined the papers describing the experiments upon which current opinions about the value of milk had been based. A number of these had been made without any supplement having been given to the control group. In some the basal diet was unknown and uncontrolled, while in others the tests had been sponsored by people interested in the sale of milk. In Corry Mann's (1926) pioneer experiments the important ingredient may have been the calcium in the milk, not the proteins or vitamins. We were forced to conclude that the intrinsic and almost mysterious value of milk had not been demonstrated so conclusively as we had supposed.

We feel justified by these investigations in making certain observations.

The experiments themselves show clearly how important it is not to generalise too widely from any experiment carried out within limiting conditions. Brown bread may be much more nutritious than white bread for the weanling rat but no more nutritious for the growing child. It follows, therefore, that if anyone wishes to know whether brown bread is or is not more nutritious than white he must define very clearly the conditions for which an answer is required. Our diets were not the same as those used in Britain or in most other countries, but they can be compared with them and the results applied to the construction and planning of diets in this country or elsewhere; and let it be remembered that when natural diets, based upon white bread, contain a sufficiency of the B vitamins, enough is as good as a feast, and the only people likely to gain anything by the manœuvre of fortification are the manufacturers of the synthetic additives. To most people, conventionally trained, the diets used in Germany appear unsatisfactory at present, but if diets such as the ones we were using, consisting largely of cereals and vegetables, can be made so nutritious that they cannot be improved by a milk supplement, this should greatly simplify the problem of those interested in nutrition in parts of the world where milk, meat, and other sources of animal protein are costly or difficult to obtain.

The results were unexpected because general opinion and also scientific opinion had been wrong in laying so much emphasis on the value of high extraction for all persons under all conditions. The mistake was made partly because the scientists, ourselves among them, had allowed themselves to be drawn into a controversy with commercial interests which was fatal to scientific detachment, and partly because they had become associated in this controversy with administrators anxious to promote what they termed "positive health," and with a most interesting group of people with subjective beliefs which can be traced back almost unchanged for thousands of years. These people's worship of Nature, desire for the good old days, call it what you will—whatever its cause, and in whatever form it may appear—should have had no place in scientific judgment.

It is of course always quite possible that little attention will be paid to these experiments of ours until we are all dead and buried. It would be difficult now, for instance, for any administrator to go back on the policy of enrichment. The herd instinct "gives widely held beliefs a spurious validity irrespective of whether or not they are founded on any real evidence." (Beveridge 1950.) Anything which threatens to make an adult change his beliefs, particularly if he has expressed them openly, is disturbing to him and it may safely be predicted—in fact it has already happened—that people who believe in the value of high extraction or have committed themselves to it will react to these results by attacking the evidence as best they can or by neglecting it, and so escape from its disturbing effects (George 1936). We shall not mind; we have had the fun of doing the work.

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NATURAL DURATION OF BRONCHIAL CARCINOMA

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IN order to find out whether a particular treatment prolongs life we must know the pattern of survival in untreated patients observed under similar conditions. The natural duration of the illness has been studied in a group of 255 patients with a bronchial carcinoma; and the influence of certain factors on survival has been investigated in order to determine which of them must be taken into account when the survival of different groups of patients is being compared.

During 1951 and 1952, 637 patients with a bronchial carcinoma were seen at the Brompton Hospital and the Royal Marsden Hospital. 135 were treated surgically and 210 by radiotherapy; 292 received no treatment likely materially to prolong their life.* In 37 of these the time when the first symptom appeared was not known; nor, therefore, is the total duration of the illness. The remaining 255 form the "untreated" group in this investigation. All but 8 are known to have died. Of the 8 who were alive at the time of the last report 4 had squamous tumours and are known to have been alive twenty-five, twenty-nine, forty, and forty-one months after the start of symptoms. No histological evidence of malignancy was obtained in the other 4, who were alive after sixteen, twenty-three, twenty-four, and twenty-seven months. The 2 who were followed up for less than two years have been counted as dead at the time of the last report.

Validity of the Diagnosis

There was histological evidence of a malignant neoplasm in 129 cases. The tissue was obtained by necropsy in 10, bronchial biopsy in 81, biopsy of a metastatic node in 25, and drill-biopsy of the primary neoplasm in 1.

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PROPORTION (%) OF TOTAL PATIENTS

The cytological diagnosis was based on examination of sputum in 9 and of pleural fluid in 3.

Among the 126 cases in which histological evidence was not obtained, there were 14 post-mortem examinations and 2 thoracotomies; the naked-eye appearances confirmed the diagnosis, but no histological examinations were made. 63 had clinical, radiographic, or bronchoscopic evidence of metastases. A tumour was seen at bronchoscopy in 13, and in a further 16 there were other suggestive bronchoscopic abnormalities. In 18 (14%) the diagnosis rested only on clinical or radiographic evidence of pulmonary abnormalities. 16 of these have died; and the course of the illness in the remaining 2 leaves little doubt that the diagnosis was correct.

Duration of Illness

It is, of course, difficult to find out precisely when symptoms first appeared. Few of the patients were examined personally; and the start of the illness has been estimated from the recorded history. When the first evidence of ill health is hæmoptysis, a febrile illness, or pain the recorded date is probably accurate. But when the first symptoms are, for example, unusual tiredness, wasting, or change in the character of a cough it is commonly impossible for the patient to remember when they began; and the recorded duration of illness is clearly only approximate. It seems reasonable, however, to assume that, with the exception of subgroups defined by the nature of the symptoms themselves, there is as much inaccuracy in one subgroup as in another; and comparison of survival-times within the whole group is probably valid. On the other hand, comparison of the duration of illness in this series with that in another recorded by a different observer would be invalid.

The deaths are not distributed evenly in the successive months (fig. 1). The highest frequency occurs in the fifth month; but 35 lived for longer than two years. As some of the patients were still alive when last heard of, the mean survival-time cannot be easily calculated. The pattern of survival has, therefore, been expressed as the median duration—the time by which half the patients were dead—together with the proportions surviving for one and two years. The median survival-time also has the advantage of being uninfluenced by the few patients who lived for exceptionally long periods.

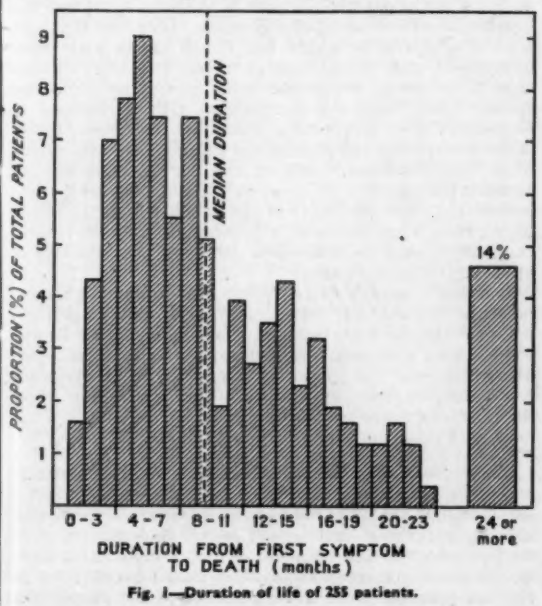

Fig. 1—Duration of life of 255 patients.

TABLE I—MEDIAN SURVIVAL-TIME AND THE PROPORTION LIVING MORE THAN ONE AND TWO YEARS AFTER APPEARANCE OF THE FIRST SYMPTOM

—	Total	Median survival-time (mos.)	Proportion (%) living longer than	
			1 yr.	2 yr.
All patients	255	9	39	14
Histologically confirmed:	129	9½	41	16
Differentiated	84	11½	46	25
Undifferentiated	45	7½	31	7
Not histologically confirmed	126	8½	36	11
Metastases at diagnosis:				
Present	94	7½	27	5
Absent	161	11½	46	22
Age (yr.):				
Less than 50	32	7½	31	9
50–59	89	8	37	15
60–69	110	9	41	13
70 and over	24	9	46	21
Site of tumour:				
Upper lobe	87	11½	47	22
Lower lobe	54	9½	40	13

Half the 255 patients were dead by the end of the ninth month; 39% survived for longer than a year and 14% for longer than two years.

Factors Influencing Duration of Life

Histological Type

The histological type of the tumour was recorded in 129 patients. There were 73 squamous carcinomas, 11 adenocarcinomas, and 45 undifferentiated carcinomas. The survival of the few with an adenocarcinoma did not differ materially from that of the squamous group, 5 surviving for a year and 2 for two years. The two types have, therefore, been combined and called the "differentiated" group. The median survival-time of those with differentiated tumours was eleven and a half months, 46% surviving for longer than a year and 25% for two years or more (table I). On the other hand, half those with undifferentiated growths were dead within seven and a half months, and the proportions surviving for one and two years were only 31% and 7%. The difference at two years was 18% with a standard error of 6%.

In the group without histological confirmation of the diagnosis the median survival-time was eight and a half months, 36% surviving for a year and 11% for two years. It is likely that this group contained relatively more with undifferentiated tumours than did the group with histological evidence, in whom the median survival-time was nine and ½ half months.

Duration of Illness at Diagnosis and Presence of Metastases

The diagnosis had been established in some of the patients before they were first seen at the hospitals. For convenience, however, the date of the patient's first attendance is considered to be the date of diagnosis in all cases. It is self-evident that the duration of life of a group of patients from the start of symptoms will be influenced by the duration of illness before diagnosis. In a disease with a median duration of life of roughly nine months, a group diagnosed after an illness of ten months or more must live longer than a group diagnosed after only three months.

The duration of life after diagnosis is related to the length of symptoms before diagnosis; but the relationship is not a simple linear one (table II, fig. 2). Thus, of the 66 patients with symptoms for less than three months half died during the next five months and 26% within three months. The prognosis became worse with increasing length of history until the median survival-time from diagnosis was only three months in those with four to five months' illness. But in those with an illness

TABLE II—MEDIAN SURVIVAL-TIME AND THE PROPORTION SURVIVING FOR DIFFERENT PERIODS AFTER DIAGNOSIS RELATED TO DURATION OF ILLNESS BEFORE DIAGNOSIS

Duration of illness before diagnosis (mos.)	Total	Median survival-time (mos.)	Proportion (%) surviving for different periods after diagnosis			
			0–2 mos.	3–5 mos.	6–11 mos.	12 or more mos.
0–1	66	5	26	36	23	15
2–3	63	4½	40	19	22	19
4–5	40	3	50	25	12	12
6–7	28	4½	39	28	18	14
8–11	25	6½	20	24	36	20
12 or more	32	7	28	12	28	31

longer than five months before diagnosis the prognosis improved; and the median survival-time after diagnosis of 32 with histories of a year or longer was seven months, only 28% dying in the next three months and 31% living for at least another year. This trend is also apparent in the prevalence of metastases at diagnosis, the highest prevalence—50%—having been found in patients with symptoms for five months (Bignall 1955); and a low survival-rate has been observed after resection in those with a similar length of history (Bignall and Moon 1955).

Patients with clinical or radiographic evidence of metastases at diagnosis survived, of course, for shorter periods after diagnosis than did those without such evidence. But they did not in general have longer illnesses before diagnosis; 50% in each group were ill for less than four months, although only 7% with metastases had been ill for longer than a year, compared with 15% of those without metastases. It is not surprising, therefore, that the total duration of the illness from the start of symptoms was found to be shorter in those who had metastases when the disease was diagnosed. There were 94 such patients with a median survival-time of seven and a half months, 27% surviving for longer than a year and only 5% for two years (table I). 161 patients had no clinical or radiographic evidence of metastases at diagnosis; and the median survival-time was eleven and a half months, with one and two year survival-rates of 46% and 22%. The difference at two years was 17% ±4% and is unlikely to have been due to chance.

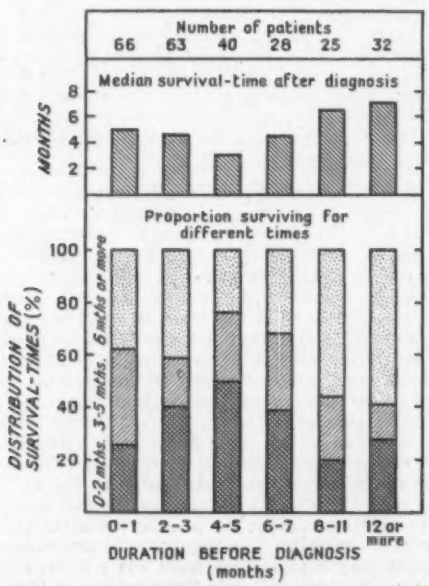

Fig. 2—Duration of life after diagnosis related to duration of illness before diagnosis.

The First Symptom

Only hæmoptysis, fever, and chest pain have been studied separately. The date of appearance of these symptoms was probably recorded with much the same degree of accuracy; and comparison of the durations of illness may be valid. On the other hand, the start of a cough, increased dyspnœa on exertion, or unusual tiredness can in general be dated only very approximately. Comparisons between groups with indefinitely dated symptoms and groups with more precisely recorded onset would clearly be unprofitable.

There were probably fewer with undifferentiated tumours among those whose illness began with pain in the chest unaccompanied by fever. The histological type was known in 24. In only 4 (17%) was it reported as undifferentiated, compared with 8 (44%) of 18 in whom the first symptom was hæmoptysis and 14 (45%) of 31 in whom the first symptom was fever. But a slightly higher proportion had metastases at the time of diagnosis—38%, compared with 27% of the other two groups combined. There were only small and unimportant differences in age and duration of symptoms before diagnosis, which are the other factors affecting prognosis. In spite of there being fewer with undifferentiated tumours among those who complained initially of chest pain, their prognosis was slightly worse. The median survival-time from the appearance of the first symptom was seven and a half months, compared with nine months in those in whom the first symptom was hæmoptysis or fever. A much higher proportion died within six months—43%, compared with 25% of the other two groups combined (difference 18% ±9%). But the differences after one and two years were smaller.

Pain in the chest, other than the pleuritic pain accompanying infection of an occluded lung segment, tends to occur late in the evolution of the symptoms. It may rarely be due to invasion of the chest wall or metastases in the ribs. More commonly there is no clinical or radiographic evidence of invasion or metastasis, and the pain has neither the well-known characteristics of pleural pain nor the intensity and clear localisation observed with rib involvement. It is a deep, persistent, ill-defined ache. Even when such a pain is the first symptom the disease may be at an advanced stage. If so, the survival-time of patients in whom the illness starts with chest pain would tend, as has been observed, to be shorter than that of those in whom the other obtrusive symptoms appear first; and the proportion with metastases at diagnosis might be greater. There are, moreover, differences between the groups in the proportions who underwent lung resection. 103 of the 637 patients studied complained initially of chest pain; only 14 (14%) had a resection. But 76 (33%) of the 232 in whom the illness began with hæmoptysis or a febrile episode were treated surgically; and the difference (19% ±4%) is unlikely to have been due to chance.

It seems reasonable to conclude that among a group of patients who started their illness with chest pain there will probably be more in an advanced stage of the disease than among groups in whom hæmoptysis or fever is the first symptom. The proportion with this initial symptom can therefore be used as an additional index when different series are being compared.

Age

The differences in the pattern of survival in the different age-groups are small; but they show a consistent trend. Thus, half of the 32 patients aged less than 50 years died in the first seven and a half months, compared with median survival-times of eight and nine months for those in the sixth and seventh decades, and nine months for the 24 patients over 70. Similarly, the proportions

surviving for one year were 31%, 37%, 41%, and 46%; and for two years 9%, 15%, 13%, and 21%. Although these differences are small the same trends are found in both histological groups; and it seems reasonable—and in keeping with clinical experience—to infer that the duration of life increases with age.

Sex

The 255 patients included only 29 women. Their pattern of survival differed very little from that of the men, half dying within the first eight months; and there was a slightly higher proportion with undifferentiated tumours.

Site of the Tumour

139 had carcinomas in the right lung and 116 in the left. In those with differentiated cancers the duration of life was in general longer in those with a right-sided lesion, the median durations being thirteen months for the right and nine months for the left; the proportions surviving for one year were 52% and 39%, and for two years 27% and 16%. The groups are small and the difference at two years (11%±9%) was probably due to chance. Moreover, in the undifferentiated group the differences are even smaller; and in those without histological confirmation they are in the opposite direction, those with left-sided tumours having higher median survival-times than those with right-sided tumours—nine and a half months and seven and a half months respectively. In the whole series there are no material differences at any stage.

On the other hand, there is at first sight a suggestion that the lobe in which the tumour is situated may have some effect. In 182 it was possible to infer the location of the tumour from the radiographs and bronchoscopy reports. 87 were in the upper lobe; the median survival-time was eleven and a half months, 47% surviving for longer than one year and 22% for longer than two years (table I). But half of the 54 with lower-lobe cancers had died after nine and a half months, 40% surviving for a year and only 13% for two years. The differences are again small. Moreover, these differences are largely caused by the experience with one lobe—the right lower. There were 28 with cancers in this lobe, and only 3 survived for two years from the start of symptoms. A similar short survival was found in those with tumours of the right main bronchus.

The numbers in each group are small and the differences slight. But tumours of the upper, lower, and main bronchi certainly behave differently in some other respects. In the whole series of 637 patients the location of the tumour was known in 505, 139 being in the right main bronchus or the right lower lobe. The illness started with a febrile episode in more of these than of those with tumours elsewhere (31% and 19%, the difference being 12%±4%). A similar, though smaller, difference is found on the left side. That fever initiates the illness less commonly in patients with cancers of the upper lobes may be due merely to the smaller risk in the upper lobes of partially stenosed bronchi becoming grossly infected. There are, however, other differences. The incidence of manifest metastases at the time of diagnosis was much smaller in those with tumours of the right main and lower bronchi (10%, compared with 24% in the remainder—a difference of 14%±4%). This difference did not occur on the left side, the proportion with metastases being in fact higher in those with left main or lower-lobe than with upper-lobe tumours. The proportion in whom a resection was done was greatest in the group with right lower-lobe bronchus lesions—40% compared with 27% of those with tumours of the left lower and both upper lobes, a difference of 13%±6%. Those with main bronchus lesions have been excluded, since operability is as likely to be affected by the position of the tumour in the bronchus as by its regional spread. Patients with lower-lobe tumours have been reported to have a shorter survival after radiotherapy (Brown 1952) and after resection (Carlisle et al. 1951), and those with right lower-lobe cancers appear to have a better prognosis after resection than those with lesions of the left lower lobe (Bignall and Moon 1955). It has also been reported that the duration of illness is shorter in untreated patients with peripherally situated tumours than in those with cancers of the major bronchi (Tuttle and Womack 1930).

These differences indicate no more than that cancers at different sites in the bronchi may produce different clinical pictures, which may themselves lead to differences in treatment and in survival after treatment. They do not support the suggestion that the duration of life in untreated patients is influenced by the particular lobe in which the growth occurs. Moreover, when to the untreated group is added the 109 patients who received palliative radiotherapy, and whose total period of survival was much the same, the differences between the lobes almost disappear. Certainly the effect of the site on survival is not large enough to be important in comparing the experience of groups of patients.

Discussion

The duration of illness cannot be measured accurately in a group of patients with bronchial carcinoma. Comparisons between groups observed under different circumstances are, therefore, unconvincing, unless the observed differences in survival are dramatic and unmistakably meaningful. Published reports and clinical experience suggest that the survival of patients treated, for instance, by radiotherapy is certainly not strikingly different from those untreated, and the alleged prolongation of life is not self-evident (Bloch and Bogardus 1940, Leddy and Moersch 1940, Tenzel 1941, Widmann 1944, Hilton 1945, Shorvon 1947). Moreover, unless patients have been allotted at random to treated and untreated groups, those given long courses of radiotherapy will almost certainly be, in general, better risks than those not treated, in many of whom the disease is not diagnosed until they are severely ill and cachectic or have widespread metastases. Some characteristics—age and sex—can be accurately recorded. Others, such as the histological type, evidence of metastases, and the site of the cancer are less accurately assessed; and there is even more possibility of error in recording the first symptom and the duration of illness. Some characteristics cannot be expressed at all in a form suitable for analysis; and these are often the most important in influencing the decision of the surgeon or radiotherapist. If a comparison is to be attempted it is necessary to know which of the factors that can be recorded might influence the duration of the illness, in order that roughly comparable groups can be constructed.

Other investigations have demonstrated that the duration of illness in a group of patients is materially influenced by the pattern of the histological types (Tuttle and Womack 1930, Bryson and Spencer 1951, Buchberg et al. 1951, Harnett 1952). It is also affected by the duration of symptoms before diagnosis and the proportion with clinical or radiographic evidence of metastases at diagnosis. It may to a less extent depend on the nature of the first symptom and the age of the patients; but it is uninfluenced for practical purposes by the site of the growth or the proportion of women in the group.

The duration of symptoms before diagnosis and the time at which treatment was given are clearly especially important factors when different treatment groups are compared. For instance, 63 patients of the 637 seen during 1951 and 1952 received "radical" courses of radiotherapy. In only 4 of them was treatment begun during the first three months of their illness. But 33 of the 255 untreated died during this period. The "radical" course of radiotherapy given at the Royal Marsden

Hospital lasts for four to six weeks. Thus, patients whose treatment was begun after three months' illness must live for a further one to two months in order to be included in the "radical radiotherapy" group. The survival of the patients with three months' history before treatment should, therefore, be compared, not with that of the whole group of untreated patients, but only with those who had survived for five months from the first symptom. Such a comparison is impossible without large numbers of patients. In a small series it might be a reasonable approximation to compare all those treated after, for instance, three or more months from the first symptom with all untreated living five or more months from the first symptom. Even these groups might be further reduced when the other important prognostic factors were considered. For instance, the influence of the presence of metastases at diagnosis is such that it is necessary to compare separately those with and those without manifest metastases in the treated and untreated series.

It is unlikely that small differences in the pattern of survival could be convincingly demonstrated as due to treatment, however large the number of patients and carefully balanced the known factors influencing survival. Yet a planned trial by random allocation is almost certainly ethically unjustified, there being general agreement that radiotherapy offers at least some hope of relieving certain symptoms.

Summary

During 1951 and 1952, 637 patients with bronchial carcinoma were seen at the Brompton Hospital and the Royal Marsden Hospital. 135 were treated surgically and 210 by radiotherapy. 292 received no treatment likely materially to prolong life; and in 255 of this "untreated" group there was sufficient information for the natural duration of the disease to be studied.

Half the 255 patients died within nine months from the appearance of the first symptom, but 14% survived for two years or longer.

The duration of life from the start of symptoms was found to be significantly influenced by the histological type, the duration of illness before diagnosis, and the presence of metastases at diagnosis. It appeared to depend, though to a less extent, on the nature of the first symptom and the age of the patient; but it was not materially influenced by sex, or by the lobe in which the tumour occurred.

The relation of the duration of life after diagnosis to the length of history before diagnosis is not a simple one. The poorest prognosis was found in those who had had symptoms for four to five months before diagnosis, half of whom died in the next three months. But half those with symptoms for a year or more lived for a further seven months, and almost a third for another year.

I am indebted to the medical committees of the Brompton Hospital and the Royal Marsden Hospital for permission to publish this report, which records part of the work of the joint consultative clinic of the two hospitals. The keeping of records and tracing of patients was largely done by Mrs. I. Appleby, of the secretarial staff of the Institute of Diseases of the Chest. I am grateful to Mr. P. M. Payne, statistician to the Royal Marsden Hospital, for his advice.

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HYOSCINE CYCLOPLEGIA IN CHILDREN

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HYOSCINE, though known as an effective cycloplegic, is not widely used as such, because of its toxic properties. If two drops of 1/4% hyoscine hydrobromide are instilled into each conjunctival sac, a total of gr. 1/100 of the drug is given. Excluding idiosyncrasies, this is probably a safe dose, and such toxic effects as have been reported are likely to have come from the use of hyoscine in higher concentrations than 1/4%. A dose of gr. 1/100 is higher than the doses given to children who receive 'Omnopon' and scopolamine as a preoperative measure; commonly ampoules of this mixture contain gr. 1/150 of scopolamine (i.e., hyoscine); and, as children are generally given about half an ampoule, they get subcutaneously gr. 1/300 of hyoscine. Such doses have to be used with care, but are apparently safe. It is impossible to assess how much of the gr. 1/100 of hyoscine in two drops into each conjunctival sac is absorbed into the system; and, though it is likely that there is a considerable loss and that the instillation is probably safe, the margin of safety with this dosage cannot be wide. Taking instillations of 1/4% as the maximum permissible, observations were made on the efficacy of hyoscine in low concentrations for the purpose of inducing cycloplegia.

Assessment of Cycloplegia

1. BY RETINOSCOPY

Observations on Hyoscine 1/4%

51 children (mostly between four and ten years of age and fairly evenly distributed over these different years) were refracted under complete atropine cycloplegia—drops or ointment of 1% effectively instilled three times a day for one week. Either several weeks before, or several weeks later, refraction was also determined after the instillation of one drop of 1/4% hyoscine into each

TABLE I—ASSESSMENT OF AGREEMENT BETWEEN REFRACTIONS DETERMINED UNDER FULL ATROPINE CYCLOPLEGIA AND AFTER THE INSTILLATION OF HYOSCINE HYDROBROMIDE IN DIFFERENT CONCENTRATIONS

—	No. of cases showing							
	Agreement				No agreement			
Hyoscine	1/4 %	1/8 %	1/12 %	1/20 %	1/4 %	1/8 %	1/12 %	1/20 %
Refraction class :								
−0·25 D. and more ..	2	..	..	..	..	..	..	..
0 to +2·0 D. ..	13½	1	2	2	2½	..	..	..
+2·25 D. to +4·0 D.	20	3	2	7	1	..	..	..
+4·25 D. to +6·0 D.	7	1	1	5	2	..	..	..
+6·25 D. and over ..	3	..	..	..	..	..	..	..
Totals	45½	5	5	14	5½	..	..	..

These data are from the records of six observers, each of whom was responsible for both refractions in the same subject. There was little individual variation. With few exceptions the children were aged 6 to 10 years and fairly evenly distributed over the different years. Results were regarded as showing agreement if the refraction by the two methods did not differ by more than 0·5 D.

In classifying the results differences of less than 1·0 D. as between the two eyes were ignored and the higher plus refraction was regarded as applying to both. The refractions under 1/4% hyoscine were done at 30–60 minutes after instilling a single drop into the conjunctival sac. With the weaker concentrations refractions were done after 1 hour.

conjunctival sac (the child therefore receiving a total of gr. $^1/_{200}$ of hyoscine). Care was taken in the instillation of such drops, a Bengué drop bottle being used to ensure some uniformity. With drops adequately instilled, and the refractions carried out within half an hour to an hour, there was agreement within 0·5 D., in 91 eyes out of a total of 102 refracted (table I). The 11 eyes in which there was no agreement belonged to 6 children (in 1 of whom one eye did show agreement). In 2 of the children the atropine refraction was the lower, and in 2 others the instillation of hyoscine was probably not effective; in the remaining 3 eyes the refractions did not tally and it was difficult to be sure which was correct. This preliminary survey therefore gave this over-all picture: of 51 children there was agreement between the two methods in 45$^1/_2$; there was no agreement in 5$^1/_2$, and there was nothing to incriminate hyoscine in this lack of agreement. Of these 51 children, 12 had astigmatism of more than 1·0 D. In 11, the amount of astigmatism as assessed by the two methods showed agreement; in the remaining child the disagreement was slight and an error of observation appeared likely. The results further suggested that if a standard time of one hour were used, and particular care taken in instilling the drops, the resultant cycloplegia was satisfactory.

TABLE II—COMPARATIVE VALUES OF POWER OF FRONT SURFACE OF THE LENS AS DETERMINED BY PHOTOGRAPHY AFTER ATROPINE CYCLOPLEGIA AND HYOSCINE CYCLOPLEGIA

Right eye		Left eye	
Hyoscine	Atropine	Hyoscine	Atropine
6·0 D.	5·8 D.	5·9 D.	5·7 D.
6·9 D.	7·0 D.	7·0 D.	7·2 D.
8·0 D.	8·1 D.	8·1 D.	8·1 D.
7·6 D.	7·3 D.	7·3 D.	7·5 D.

Atropine cycloplegia was induced by instilling ointment of atropine sulphate 1% three times daily for a week. Hyoscine hydrobromide was used in a concentration of $^1/_{20}$%, two drops being instilled into the conjunctival sac 1 hour before examination.

At this stage two obvious advantages of hyoscine over the classical atropine cycloplegia became apparent. In the first place it was possible to achieve cycloplegia rapidly: as against repeated instillations of atropine, one instillation of hyoscine was adequate. Secondly, the cycloplegia induced by hyoscine wore off quickly, for children appeared to be normal within forty-eight hours.

Observations on Hyoscine $^1/_8$%, $^1/_{10}$%, and $^1/_{40}$%

Since the amount of hyoscine given to a child by one drop of $^1/_4$% into each eye was in excess of that given subcutaneously as a preoperative measure, trials were made with instillation of drops of a lower concentration. As can be seen from table I, there were 5 cases treated with one drop of $^1/_8$%, and another 5 with one drop of $^1/_{10}$%. In all these cases (mostly children between five and eight years) the hyoscine refraction was carried out one hour after instilling the drop, and complete agreement was obtained between the atropine and hyoscine refractions. In 3 cases $^1/_{40}$% was used, but neither dilatation of the pupil nor the cycloplegia was constant. The subsequent observations were made on cycloplegia induced by drops of $^1/_{20}$%.

Observations on Hyoscine $^1/_{20}$%

As can be seen from table I, in 14 children (11 of whom were aged six to eight years, 2 ten years, and 1 three and a half years) there was complete agreement between the atropine and hyoscine refractions in all cases. 3 eyes (in 3 different children) showed astigmatism of over 1·25 D.; here too, the results by the 2 cycloplegics agreed. As with the other instillations of hyoscine in low concentrations, refractions were carried out one hour after instilling one drop into the conjunctival sac.

TABLE III—MEASUREMENT OF POWER OF THE FRONT SURFACE OF THE LENS BY THE PHOTOGRAPHIC METHOD ONE HOUR AND TWO HOURS AFTER INSTILLING TWO DROPS OF $^1/_{20}$% HYOSCINE HYDROBROMIDE INTO EACH CONJUNCTIVAL SAC

Power of front surface			
Right eye		Left eye	
1 hr.	2 hr.	1 hr.	2 hr.
8·2	7·7	8·2	7·6
6·9	6·8	7·4	6·8
7·0	7·1	7·0	7·0
7·1	7·2	7·5	7·4
8·3	8·1	8·5	8·0

2. BY OTHER CRITERIA

Measurement of Residual Degree of Accommodation

Clinical methods for assessing the efficacy of cycloplegics are all rather inadequate, for with full cycloplegia they all show an apparent residual degree of accommodation. In 4 children, all aged eleven to twelve years, the amount of such residual accommodation was measured by subtracting from 3 D. the power of the addition required to read J.1 at 33 cm. The binocular residual degree of accommodation found three hours after instillation of two drops of $^1/_{20}$% hyoscine hydrobromide into each eye was 1·50 D., 1·75 D., 2·0 D., and 0·75 D., for the 4 children tested. This agrees fairly well with the amount of 1·42 D., found by Brickley and Ogle (1953) as an average by this method for patients with full atropine cycloplegia.

Measurement of the Anterior Surface of the Lens

A photographic method, modified from those developed by Fincham (1937) and by Campbell and Primrose (1953), which will be described in a subsequent publication, was used for assessing the curvature of the anterior surface of the lens in 4 cases, both after atropine cycloplegia and after cycloplegia induced by two drops of hyoscine $^1/_{20}$% instilled one hour before measurement. The results are shown in table II. It will be seen that there is close agreement between the measurements obtained by the two methods.

The Time-factor in Hyoscine Cycloplegia

No full study on this aspect has been carried out. The following observations appear to be valid:

(1) The pupil is generally well dilated within twenty minutes.

(2) Effective cycloplegia appears to be achieved by the end of the first hour.

In 5 children the power of the front surface of the lens was determined by the photographic method at one hour and at two hours after instilling two drops of $^1/_{20}$% hyoscine into each conjunctival sac. The results are shown in table III from which it is seen that in 6 eyes there was close agreement between the findings at one hour and at two hours; in the remaining 4 eyes a reduction of about 0·5 D. in power had occurred between one and two hours after instilling the drops.

It may be noted that a difference of 0·5 D. in the reading of the power of the anterior surface of the lens would give a difference of about 0·4 D. in the clinical refraction.

(3) Cycloplegia persists maximally for at least six hours.

In 2 children the persistence of cycloplegia, as determined by the curvature of the anterior surface of the lens, was measured by the photographic method with the results shown in table IV. It will be seen that by one hour cycloplegia is not far from fully effective. Such reduction in the power of the anterior surface of the lens as occurs in the second hour and subsequently lies within the experimental error—findings supported by those on the anterior chamber. Cycloplegia appears to be maintained for at least six hours. The rapid onset of cycloplegia and the relatively rapid wearing off is shown by the readings recorded at five and at fifteen minutes, and at twenty-four and twenty-five hours.

TABLE IV—POWER OF THE FRONT SURFACE OF THE LENS AND DEPTH OF ANTERIOR CHAMBER AT DIFFERENT TIMES FROM FIVE MINUTES TO TWENTY-FOUR HOURS AFTER INSTILLING TWO DROPS OF $^1/_{20}$% HYOSCINE. ONE EYE MEASURED IN TWO SUBJECTS

Interval after instilling hyoscine	P.C., aged 12: refraction +0·75 D.				M.S., aged 12: refraction +0·5 D.	
	Power of lens (D.)		Depth of anterior chamber (mm.)		Power of lens (D.)	Depth of anterior chamber (mm.)
	First observation	Repeat observation	First observation	Repeat observation		
5 minutes	..	..	..	..	11·1	3·0
15 minutes	..	8·5	..	3·4	..	..
1 hour	7·0	6·7	3·7	3·6	8·3	3·3
2 hours	6·9	6·5	3·8	3·6	7·8	3·3
3 hours	6·7	6·5	3·8	3·6	7·9	3·3
4 hours	6·8	6·6	3·8	3·6	7·9	3·3
5 hours	6·7	6·6	3·8	3·7	7·9	3·3
6 hours	6·6	6·6	3·8	3·7	7·7	3·4
24 hours	7·9	7·7	3·6	3·6	8·8	3·3
25 hours	..	8·5	..	3·6	..	..

(4) Clinically much of the cycloplegia has worn off within twenty-four hours.

(5) Children are generally able to do their lessons within forty-eight hours.

Discussion

The available evidence shows that cycloplegia comparable to that obtained from repeated instillations of atropine 1% is obtained by a single instillation of one drop of hyoscine hydrobromide $^1/_{20}$%. Such cycloplegia sets in within one hour and has worn off within forty-eight hours. Support for the validity of these clinical findings is given by observations on residual accommodation and on measurement of the anterior surface of the lens, and of the depth of the anterior chamber.

An instillation of one drop of $^1/_{20}$% hyoscine into each eye gives a total of gr. $^1/_{1000}$ of hyoscine—i.e., less than one-third of the dose used widely as a subcutaneous injection for premedication in children. The instillation of a second drop of hyoscine in this concentration would, therefore, still leave a very wide margin of safety.

Since this method has been evolved it has been used in some 800 children, the subjects of a special investigation into the nature of refractive errors. In no case has there been any suggestion of toxic symptoms, and in all but 2 cases the desired cycloplegia was achieved. In the 2 cases where this was not obtained, atropine too gave no ready result.

One of us, in charge of a school clinic, has been using the method advocated here as a routine for all children—squinters not excepted. There appears to be no reason why a single application of two drops of hyoscine in a concentration of $^1/_{2000}$ should not replace repeated instillations of atropine in the routine refraction of children. The advantages of hyoscine cycloplegia, as described here, are too obvious to need labouring.

Summary

Taking one drop of $^1/_4$% of hyoscine as the maximum permissible dose as an instillation into each conjunctival sac, the findings in 51 children suggested that the cycloplegia achieved was as good as that obtained by the generally used method of repeated atropine instillations.

With cycloplegia achieved by the instillation of two drops of $^1/_{20}$% hyoscine, assessment of residual accommodation in 4 children showed close agreement with the amount recorded by other observers for full atropine cycloplegia.

With similarly induced cycloplegia in 8 eyes studied, the power of the front surface of the lens showed close agreement with the values obtained under atropine cycloplegia.

In 5 subjects investigated, there was little difference in the power of the front surface of the lens at one hour and two hours after the instillation of two drops of $^1/_{20}$% of hyoscine.

With hyoscine cycloplegia, assessment of the power of the front surface of the lens and of the depth of the anterior chamber over a period of five minutes to twenty-five hours after the instillation of two drops of $^1/_{20}$% suggests that cycloplegia is clinically effective by one hour, is maximal by two hours, maintained for at least a further four hours, and is wearing off by twenty-four hours.

On the available evidence a single instillation of two drops of hyoscine hydrobromide $^1/_{2000}$ into the conjunctival sac appears to give within one hour cycloplegia as adequate as is achieved by the repeated instillations of atropine sulphate over several days. The procedure advocated here has been used successfully without untoward result in well over 1000 children.

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INTERPRETATION OF TUBERCULOUS LESIONS AFTER CHEMOTHERAPY

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Now that there is a fairly definite picture of the changes in tuberculous lesions after chemotherapy with different drugs, it is possible to judge their significance. In tuberculosis, a chronic disease with very complicated immunity and hypersensitivity reactions (both local and general), resulting in varied lesions often existing over widely differing periods of time, there is considerable overlap in the changes found in untreated cases on the one hand and in treated cases on the other. Accordingly, emphasis is laid here on the average reactions to each treatment considered.

Recent Lesions

AFTER STREPTOMYCIN

The changes in tuberculous lesions after treatment with streptomycin and a combination of streptomycin with *p*-aminosalicylic acid (P.A.S.) were studied after various periods of treatment in miliary tuberculosis (Ritchie, Taylor, and Dick 1953) and in renal tuberculosis (Dick 1953a, 1954). From this material a composite picture of the course of events in recent lesions was built up, and this confirmed fully the earlier descriptions (see *Lancet* 1955) and the conclusions that these are the non-specific changes that occur with regression of untreated tuberculosis lesions under favourable circumstances. Thus, fibrosis develops within and around the epithelioid zone of individual follicles and surrounds each follicle and group of follicles; it also extends from the epithelioid zone into any central caseation: in this process the epithelioid and giant cells remain unaltered for long,

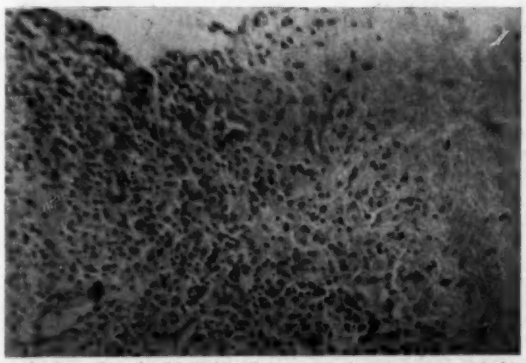

Fig. 1—Reversion of epithelioid cells to macrophage type: granulation tissue becoming non-specific. After two weeks' isoniazid + P.A.S. (× 150.) All sections stained with hæmatoxylin and eosin.

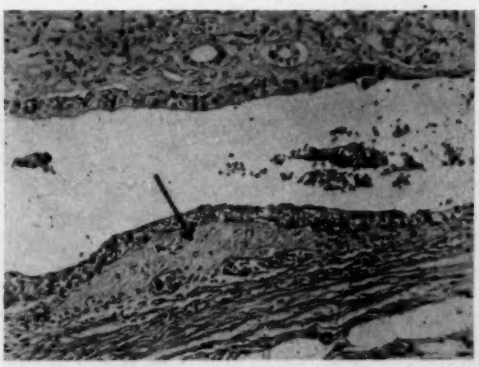

Fig. 4—Small patch of very loose granulation tissue (arrow) under calyx epithelium, an absorbing lesion. After five weeks' isoniazid + P.A.S. (× 100.)

though they gradually disappear as the fibrosis becomes more dense and contracted. Simultaneously, any non-specific exudate (as in the perifocal reaction, in tuberculous bronchopneumonia, in the meninges, and on serous surfaces) becomes re-absorbed if slight in amount and loose in structure; but if abundant and dense (especially in the meninges) it also undergoes fibrosis. The sooner lesions cease to progress, stopped either naturally or by the administration of streptomycin, the smaller will be the ultimate fibrosed scar; while the degree of clearing round the lesion depends entirely on the amount and density of the reaction which has developed before regression commences.

This picture of fibrosis, though often described as "healing," is healing of a degree inferior even to that of a foreign-body reaction: the process is relatively avascular, there is only slight regeneration of specialised cells or tissues of the organs involved, and necrotic or caseated tissue remains in situ, surrounded by the dense fibrosis, and frequently becomes calcified. There is none of the active repair which follows a simple injury or even a healed pyogenic infection. There is some depressing factor, acting like a toxin, still present in the tissues. Until recently this was accepted as the most favourable outcome which could be expected for the general run of tuberculous lesions, and true healing, involving complete resolution of the lesions, was believed to be rare (Fishberg 1932, Pinner 1945, Rich 1951, p. 735).

Nevertheless it was believed that healing which left no discoverable trace must occur commonly in certain circumstances—e.g., in adult-type pulmonary tuberculosis in other parts of the lungs while the presenting lesions developed in the subapical areas (see *Lancet* 1954), or in individuals who were in contact with patients and must have become infected yet never developed signs. Such lesions, however, were rarely available for histological examination.

AFTER ISONIAZID

After isoniazid therapy also, the changes in renal tuberculosis have been followed according to the length of treatment, and are practically the same in recent lesions for isohiazid alone (Dick 1953b), for isoniazid combined with streptomycin (Dick 1954), and for isoniazid combined with P.A.S. (18 specimens have been examined after this last régime). They have also been described for miliary and meningeal lesions (Ritchie, Taylor, and Dick 1953, Canetti 1954) and for pulmonary lesions (Canetti 1954). To appreciate the full details of the process, observations must be made from the second to the eighth week of treatment. Within this period recent lesions disappear completely, in a way never before believed possible in man.

First, there is increased vascularity, due both to congestion of existing capillaries and to formation of others, often with small hæmorrhages in and around the lesions; simultaneously the epithelioid cells revert to their parent type of ordinary macrophages (fig. 1), sometimes producing masses and islets of "foamy cells," and subsequently many are re-absorbed from the lesions; vacuolation occurs between the macrophages, indicating absorption of necrotic material, and this also occurs along the edge of caseation. The tuberculous granulation tissue becomes transformed into non-specific healing granulation tissue. At the same time, there is vigorous regeneration of the specialised cells of

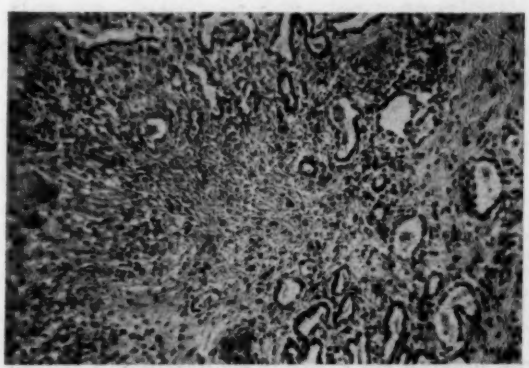

Fig. 2—Regenerating epithelium in lung alveoli round a healing lesion. After two months' isoniazid. (× 100.)

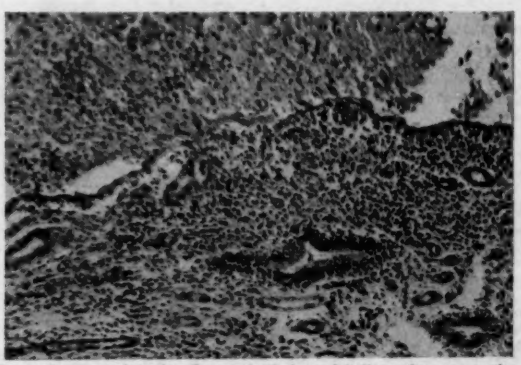

Fig. 3—Regeneration of surface and tubular epithelium after a caseating lesion in a calyx. After fifteen weeks' isoniazid + P.A.S. (× 100.)

Fig. 5—Larger lesion with central caseation (lower left centre), all becoming converted into loose connective tissue: tubules engulfed in lesion show regeneration of their epithelium. After six weeks' isoniazid + P.A.S. (× 100.)

the organ (figs. 2 and 3). If the area involved is small the lesion becomes completely absorbed in two to eight weeks (fig. 4): if slightly larger a small quantity of very loose granulation tissue persists for eight to twelve weeks or perhaps longer; and larger lesions (fig. 5) may leave quite extensive areas of very loose fibrous tissue which gradually contract to small scars. The only tuberculous elements not removed are the giant-cells: these vary greatly in number and morphology in different cases; and when Denst (1953) and De Figueiredo and De Paola (1955) reported an unusual number and pleomorphism after isoniazid therapy, they may have seen the remains of much more extensive lesions which had otherwise been absorbed, and similarly with their reports of exuberant collagenous formation. There is nothing in recent lesions following isoniazid like the dense fibrosis after streptomycin. Others of the various features mentioned above as being involved in the process have been emphasised in other investigations, mostly on lung lesions (see *Lancet* 1955).

This histological reaction during isoniazid therapy suggests that the toxic factor (which remained during streptomycin therapy) has been removed from the tissues either by the isoniazid itself or by the drug having a more profound action on the tubercle bacilli. Mackaness and Smith (1953) have shown that both streptomycin and isoniazid are bactericidal and that the latter kills intracellular as well as extracellular tubercle bacilli. Both drugs act by killing sufficient numbers of the invading bacilli to enable the body's reactive forces to come into play in all acute lesions. But the difference in reaction with the two drugs is more than just the difference in the intracellular killing of bacilli by isoniazid. The number of mononuclear cells which undergo the change into epithelioid cells is often far greater than the number of invading organisms, and some are situated beyond the actual site of the organisms (Florey 1954, p. 638): yet the reversal of epithelioid cells to macrophages can occur with isoniazid, but not with streptomycin. The increased vascularity and rapid epithelial recovery with isoniazid also suggest the removal of a depressing or toxic factor.

That this toxic factor is not confined locally to the lesions is suggested by the following evidence. The early clinical reports on the effect of isoniazid all emphasised the rapid occurrence of a feeling of well-being in the patients. This was crystallised in the preliminary report of the M.R.C. trials (Medical Research Council 1952) where it was shown that after a three-month course with isoniazid, patients showed greater gain in weight and improvement in general condition than with streptomycin + P.A.S., though slightly less reduction in fever and erythrocyte-sedimentation rate. Subsequently it was shown (Medical Research Council 1953a and b) that, while all acute lesions were checked and the patients all gained weight with either streptomycin + P.A.S. or streptomycin + isoniazid, there was a greater degree of healing and so a greater gain in weight with the latter combination. That this was not due to a non-specific stimulating effect of the isoniazid was shown by Mudie et al. (1954) and Laron (1954). The fact that changes in the histological appearances occur only round active lesions also confirms that the increased improvement in weight and general condition with isoniazid were due, not to any general stimulating effect, but to local removal of a depressing or toxic factor which still persisted with streptomycin.

Further evidence of the persistence of a toxic factor after streptomycin therapy is provided by the mortality-rates reported in the five-year report (Fox et al. 1954) of the first M.R.C. trial of streptomycin: the curve for the deaths after four months' treatment with streptomycin in acute bilateral pulmonary tuberculosis (a very serious form of the disease) in young adults followed very much the same pattern as that for the controls but was delayed so that the peak for the rapid rise occurred about twelve months after that for the controls and was not quite so high. The streptomycin had not mastered the toxic effect of the disease in most cases, though it had delayed it. This was also shown by Kreisel et al. (1953) and Monroe et al. (1955). If this reasoning from the histological findings is correct, the death-rate in similar cases of acute disease after isoniazid therapy should be very considerably reduced.

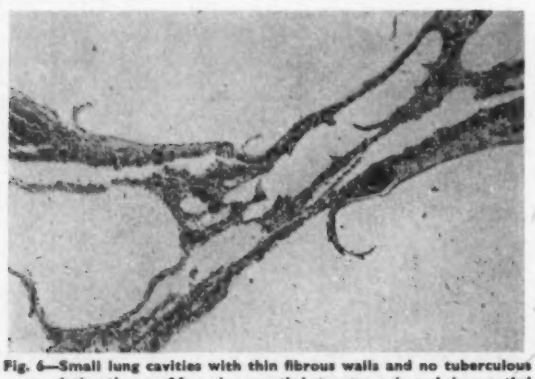

Fig. 6—Small lung cavities with thin fibrous walls and no tuberculous granulation tissue. After nine months' streptomycin and six months' P.A.S. (× 100.)

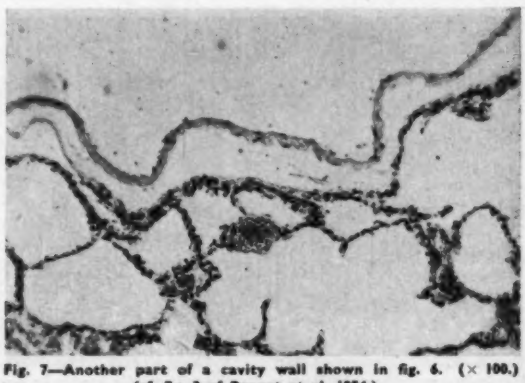

Fig. 7—Another part of a cavity wall shown in fig. 6. (× 100.) (cf. fig. 3 of Brouet et al. 1954.)

It has not been possible to identify either an endotoxin or an exotoxin from the tubercle bacillus (Rich 1951, p. 4); but from in-vitro experiments with macrophages Florey (1954, p. 641) suggests that there is a cytotoxic effect due to a toxic component of the bacterial cell. Sabin and her co-workers have studied the chemical fractions from cultures with a view to examining their toxicity, but a much greater quantity of any fraction is required to produce a lesion in tissues than is present in the number of living bacilli required to produce a lesion of similar size. It is accepted that the development of necrosis in the lesion depends on sensitisation of the tissues (Florey 1954, p. 641). If, however, bacterial hypersensitivity were responsible for most of the changes in the lesions, it would seem extraordinary that so much of the lesions can be reversed with isoniazid, and it would be expected that the disease would be better controlled by cortisone and corticotrophin, whereas unfortunately the disease can progress during the period of administration of these drugs (American Trudeau Society 1952).

While histological investigation gives no clue to the nature of the toxic factor in tuberculosis in man, the very fact that it can be neutralised by isoniazid in recent lesions may stimulate further investigation.

As indicated in the introduction, the average tissue reaction to the drugs has been considered at length, but exceptional responses, either good or bad, may also be obtained. Thus, after streptomycin therapy it may happen that, if the lesions are obtained very early and the patient's resistance is sufficiently good, an appearance closely resembling resolution may be found (figs. 6 and 7). Even without streptomycin such may be the course of events when infection occurs in individuals with good

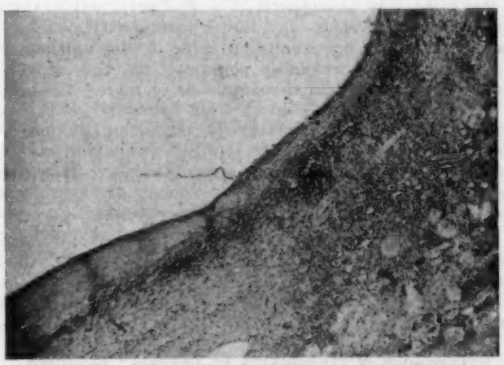

Fig. 8—Old cavity with smooth wall and thin epithelium. Other lesions, present in the same kidney, were active. No chemotherapy. (× 25.)

natural resistance and no patent illness develops. On the other hand, an occasional very toxic case may be met in which no drug treatment is of any avail:

A woman, aged 63 years, admitted with eight weeks' history of cough, spit, and dyspnœa, showed physical signs and radiographic evidence of infiltration of the left lower lobe and sputum positive for tubercle bacilli. She was given streptomycin and isoniazid; but her condition steadily deteriorated, a broncho-œsophageal fistula developed, and she died sixty days after admission. At necropsy both lung bases showed slight aspiration bronchopneumonia, and the apex of the left lower lobe showed puckering, fibrosis, and small calcified plaques. Histologically the left lower lobe showed tuberculous lesions which had resolved almost completely, leaving fairly numerous giant-cells in many alveoli and there was remarkable recrudescence of bronchial and alveolar epithelium. Until the broncho-œsophageal fistula developed there was no physical lesion to account for the steady deterioration of the patient's condition, apart from tuberculous toxæmia.

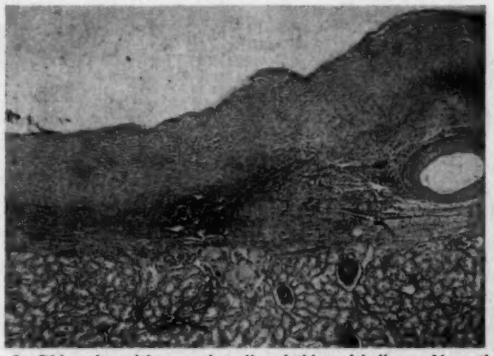

Fig. 9—Old cavity with smooth wall and thin epithelium. No active lesions in this kidney. After six months' streptomycin + P.A.S. (× 25.)

It can now be postulated that minute lesions may develop and regress completely, if the body defences can control the toxæmia. When a lesion progresses sufficiently to present clinically, however, the toxæmia has overcome the defences and some assistance is generally required. It is not claimed that isoniazid acts specifically against the toxæmia in acute tuberculosis, but the drug possesses a sufficient degree of bactericidal effect not only to arrest the activity of recent tuberculous lesions but also to enable the body defences in the great majority of early cases to overcome the toxæmia and achieve resolution of the lesions. Streptomycin possesses a lesser degree of bactericidal activity, sufficient to arrest the activity of most recent lesions but not sufficient to enable the body to overcome the toxæmia, leaving the lesions to undergo regressive fibrosis.

Chronic Lesions

AFTER STREPTOMYCIN

In chronic lesions after streptomycin alone (Dick 1953a) or streptomycin + P.A.S. (Dick 1954), active parts became quiescent (except with the development of resistance following streptomycin alone) and the lesions regressed as in naturally regressing lesions; individual follicles or groups of follicles became more and more densely fibrosed, and epithelioid cells gradually disappeared; giant-cells were usually relatively scanty and it was presumed that some had disappeared; if a little caseation was present the fibrosis traversed it and caseation and fibrosis sometimes became a hyaline mass. After two or three months' treatment with the drugs it became very difficult and ultimately impossible to decide how much of the fibrosis was due to treatment and how much to natural regression before treatment started.

This material and more recent specimens were further examined, especially with regard to the cavity walls. Here the fibrosis occurred in two sites:

(1) Central fibrosis formed at right-angles to the cavity wall, running between the palisaded epithelioid cells into the caseation. If this part and the necrotic material were dense the cavity wall was not affected by treatment and remained with a "shaggy" wall and adherent caseation; if it was loose and the caseation soft the cells gradually disappeared or were desquamated, leaving on the surface the fibrosis at the second site.

(2) Peripheral fibrosis formed round the lesion, and if it became exposed to the cavity the wall was smooth and often hyalinised, and ultimately acquired a flattened epithelial lining.

Unfortunately, both results were often found at different parts of the same cavity wall so that the smooth lining did not surround the whole cavity. A cavity with the whole lining smooth is occasionally found in untreated

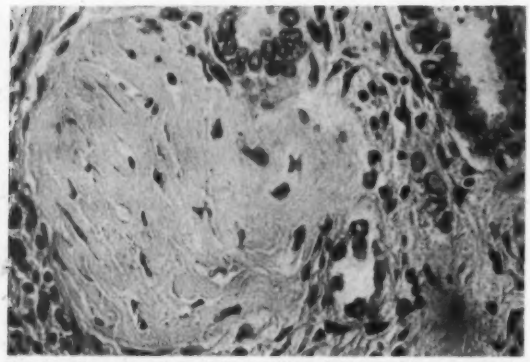

Fig. 10—Fibrosed and hyalinised miliary follicle. After ten weeks' streptomycin + P.A.S. (× 400.)

tuberculosis, in kidney (fig. 8), and in lung (Auerbach et al. 1953, Pagel 1953), but is more common after streptomycin (fig. 9).

Renal tuberculosis provides an extremely stringent test for the healing of lesions. There is no coördination between the duration of symptoms and the duration of lesions, and the great majority of specimens contain lesions of long standing before the diagnosis was made; on the other hand, a few specimens from patients with long histories of hæmaturia had very small lesions. Accordingly, it is instructive to consider how the whole specimens reacted to treatment.

Of 35 kidney specimens from patients who had been treated with streptomycin + P.A.S. (in 16 cases for more than two months) only 1 showed smooth fibrosis of all cavity walls (fig. 9) and dense fibrosis (leaving only a few epithelioid or giant cells) of all lesions elsewhere in the organ; 1 other showed only hyalinised miliary follicles with no trace of a cavity (fig. 10); while a 3rd showed repair of a calyx but no real cavity, and a closed caseated focus was still present in the organ. All the rest still presented cavities with rough or shaggy parts in their walls, though other parts showed smooth fibrosis with varying amounts of re-epithelialised surface.

These regressive changes developed only in tuberculous lesions active at the onset of treatment. Old, inactive lesions showed no change as the result of the streptomycin and appeared exactly similar to old lesions found in untreated patients.

AFTER ISONIAZID

The changes in chronic renal lesions have been described following isoniazid alone (Dick 1953b) and isoniazid + streptomycin (Dick 1954). Following isoniazid + P.A.S., 18 specimens of kidney or portions of kidney have also been examined and the same series of changes has been found as after isoniazid + streptomycin, with one exception: the secondary pyogenic infection, present in three-quarters of all the tuberculous kidney specimens examined in these chemotherapy and control trials, was not so well controlled in the early stages as when streptomycin was combined with the isoniazid, showing that the streptomycin had a beneficial effect on the pyogenic infection.

Parts of chronic lesions showing recent activity underwent the same resolving changes as occurred in recent lesions; in addition, there was some loosening and vascularity of the surrounding fibrous tissue and distinct vacuolation of the edges of caseation in necrotic lesions. In cavity walls this often led to desquamation, sometimes of the inner part of the wall, sometimes of the whole wall, leaving healthy tissue below; in each case there was excellent regeneration of epithelium, which came to line all the smooth parts of the wall and, where there had been desquamation of the whole wall, removed all evidence of the tuberculous lesion. Unfortunately, in many of these chronic cavities there were inactive parts with dense fibrosis and dense caseation which remained unaffected by the chemotherapy and so halted the healing process in the other parts. Another barrier to healing was the presence of secondary pyogenic infection (Dick 1954).

Of 34 specimens now examined after treatment with isoniazid + streptomycin (23 after treatment for two months or more) 4 showed complete resolution of all tuberculous lesions, while 3 others showed only slight remnants, and in another 2 most of the cavity walls were of old smooth hyaline fibrosis while all recent lesions had resolved. Of 18 specimens from patients treated with isoniazid + P.A.S. (9 for more than two months) 2 showed complete resolution of all the tuberculous lesions. In the remainder of both series, resolution was modified by secondary pyogenic infection or by inactive old lesions.

Similar appearances have been reported for lung cavities after treatment with isoniazid combinations (Brouet et al. 1954, Bernard et al. 1954, Canetti 1954), the noteworthy points being that the cavity is sometimes lined wholly or partly with epithelium, the wall is of dense collagen with no evidence of tuberculosis, there may be caseous remnants (perhaps with virulent tubercle bacilli), and there may or may not be communication with bronchi.

The control of the toxic effect of active parts of chronic lesions is again exerted by isoniazid and not by streptomycin, as in recent lesions. After resolution of the most recently active parts, however, the inertia of dense fibrosis and caseation presents a barrier that is tackled in the same way as a result of both drug combinations and natural regression—by lining cavities with smooth fibrous tissue and eventually covering it with epithelium from the nearest available sources. By this stage—i.e., after treatment for three months or more—the local toxic effect must have gone from many of even the streptomycin-treated or naturally regressing lesions, as this newly formed epithelium can line the whole cavity. The host's defences have now come into play, as is suggested in Hart's (1954) excellent survey of the rôle of the host in the chemotherapy of tuberculosis.

The excellent results in 10% of these difficult cases emphasises the importance of finding cases promptly and starting treatment with an isoniazid combination of drugs promptly, with a view to obtaining complete resolution where possible.

Persistence of Organisms in Lesions: Relapses

In specimens of kidneys examined after various chemotherapeutic régimes a very detailed histological examination for the presence of tubercle bacilli in the whole specimen after the method of Medlar (1926) was not attempted. But a section from each of six to twelve blocks examined in each specimen was stained by Ziehl-Neelsen's method, and the results were, in a way, very disappointing. Acid-fast bacilli, morphologically typical tubercle bacilli (many of the so-called degenerate forms were also seen but disregarded), were found without prolonged search in caseated material, both in closed lesions and more so in open cavities, in several specimens even after three to six months' treatment with any of the chemotherapeutic agents. This is the more surprising in the kidneys, especially in the open cavities, where the drugs are continually present in the urine and would be expected to get easy access to the organisms. Moreover, the organisms were usually seen in the largest numbers at the edges of, or in cracks in, the caseation, especially at points near the cavity wall where healing and old

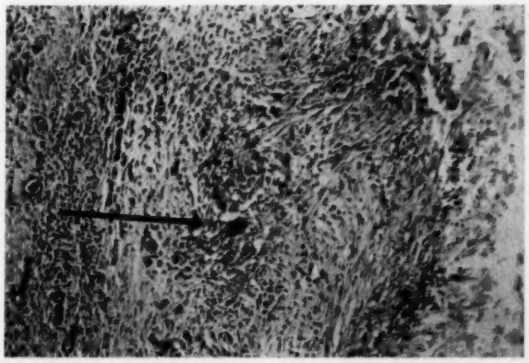

Fig. 11—Recently active giant-cell tubercle (arrow) in old fibrosed cavity wall. After nineteen weeks' isoniazid + P.A.S. (× 100.)

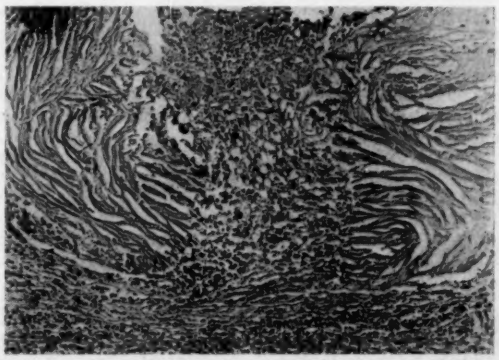

Fig. 12—Recently active tuberculous granulation tissue in old fibrosed cavity wall. After three months' isoniazid + streptomycin. (× 100.)

inactive parts met. In other specimens no tubercle bacilli were seen, though many closed and open lesions were present, and there seemed to be no means of distinguishing between the specimens which showed many and those which showed no bacilli.

Even without directly displaying the organisms in the lesions, histological examination of the walls of old cavities showed that there were occasional areas, either outside, inside, or in the thickness of the walls (figs. 11 and 12) in which much more recently active tuberculous granulation tissue was present. The appearances suggested that organisms had lain latent in the tissues for a considerable time and reassumed activity, thus accounting for relapses after treatment.

Clinical and bacteriological evidence is consistent with this finding. The following case showed a latent period, after treatment with tuberculin, followed by recrudescence twenty-five years later.

A man, aged 48 years, had extensive tuberculosis of the lungs and of the kidneys, seminal vesicles, prostate, and bladder. He responded very well to sanatorium treatment and tuberculin, and the lesions became quiescent (those in the prostate were calcified) and remained so for twenty-five years. After an injury to his side, lesions in one kidney became active again and the organ was removed after three months' treatment with streptomycin + isoniazid. The kidney showed a firmly fibrosed outer rim, the centre being occupied by large cavities with white caseous material; the cavity walls showed dense old fibrosis with hyalinisation but no epithelial lining; parts had been recently active but were undergoing resolution.

Operations may also rouse latent organisms to activity, as the following 2 cases show.

A man, aged 21 years, had a fall, followed by swelling of the right elbow, found to be tuberculous. Two years later the patient was admitted for correction of the poor position of his elbow. The elbow was brought to an angle of 90° under an anæsthetic and maintained in posterior plaster-of-paris. Three months later, tuberculous abscesses had developed and broken down round his elbow. One month later he showed signs of renal tuberculosis, and two months later acute miliary tuberculosis developed. This cleared with two months' streptomycin therapy, with distinct healing of the sinuses round his elbow; but tuberculous meningitis led rapidly to death, despite continued streptomycin, after another two months.

A girl, aged 11 years, had miliary tuberculosis and tuberculous meningitis and was treated for one year with streptomycin and P.A.S. She recovered well but had residual stiffness of both knees. Eighteen months later, when there had been no signs of reactivity, to complete her recovery manipulation of the knees was carried out under an anæsthesia. Relapse of the meningitis occurred, and she died after fifty days of progressive deterioration despite streptomycin and isoniazid therapy.

It has been a great disappointment that chemotherapy has not prevented this persistence of organisms in the lesions and that relapses still occur. At first it was thought that the organisms still seen in lesions after treatment were not viable (see Hobby et al. 1954), but many workers (see *Poumon* 1954) have cultured organisms by standard methods after many combinations of chemotherapy. Dubos (e.g., 1952, 1953) has carried out much work on the conditions in tuberculous lesions which prevented growth of the organisms and has also found other factors which can neutralise these conditions: by using some of these findings, Hobby et al. (1954) have evolved a technique of maintaining material in albumin for long periods, subculturing at intervals, from which they conclude "that tubercle bacilli can survive in healed or semi-healed necrotic pulmonary lesions even after prolonged chemotherapy and in many instances can be cultured." These workers discuss the idea of the organisms lying latent or dormant in the lesions. The question whether the drugs cannot penetrate to the organisms to affect them, deep in the lesions, has also been studied and can probably be disregarded (Hart 1954, Russell et al. 1955). It has been shown that some organisms from a culture can remain viable after thirty years' storage at 37°C (Corper and Cohn 1951) or after two years in a refrigerator (Yegian 1952). It is now generally accepted that organisms in this latent or non-proliferative phase are not susceptible to chemotherapy (Middlebrook and Yegian 1946, Mackaness 1952, Mackaness and Smith 1953, Schaefer 1954). It is the inability of drugs to affect these dormant bacilli that constitutes the greatest danger in using cortisone and corticotrophin in tuberculosis.

Clinicians have already tacitly recognised this dormant state of the bacilli by continuing chemotherapy for considerable periods, in the hope that many of the organisms will come out of the state, become susceptible, and be killed. The continuing chemotherapy must obviously be at full doses to achieve this. The histological and bacteriological studies, however, suggest that this will not control all the organisms; and such studies give full justification for surgery in chronic lesions, wherever possible.

Bacterial Resistance and Combined Chemotherapy

In the report on the effects of streptomycin on the histology of renal tuberculosis (Dick 1953a), the specimens had been removed only when tuberculous activity had recurred after treatment. In 6 out of 8 specimens the organisms had become resistant to streptomycin; in 1 specimen, culture after treatment was not carried out; and in the 8th the organisms remained susceptible. It was also recorded that, in as many other cases in the

clinical trial in which the organism developed resistance to streptomycin, nephrectomy had not been required, and in 1 in which the organism was originally very resistant to streptomycin the drug had a favourable effect on the patient's condition. Thus it would seem that the resistance of the organism to the drug as tested in vitro, though useful, was by no means an absolute indication of the clinical effect.

Similarly, after isoniazid alone (Dick 1953b) the lesions in some specimens did not resolve but became active again, and, though cultures were not obtained in sufficient numbers after treatment to provide definite evidence of the development of drug-resistance, there was sufficient histological evidence to show that isoniazid alone was not a satisfactory treatment régime.

During or immediately after combined chemotherapy there was no histological evidence of renewed activity of lesions, though some time after all forms of treatment relapses did occur owing to persistent organisms. The combination of streptomycin + P.A.S. produced the same regressing fibrosis as occurred in favourable circumstances without drugs; isoniazid + P.A.S. produced 2 excellent results in a very short time, but the others were not so good on account of the secondary infection; while isoniazid + streptomycin provided the most satisfactory results of all, with complete resolution of recent lesions and a lesser degree of fibrosis in older lesions.

Clinical evidence has fairly uniformly supported the contention that the development of streptomycin resistance has been accompanied or followed by diminished clinical response (Medical Research Council 1950), but the position with isoniazid alone is more confused. Some records show clinical deterioration with the development of resistance (Joiner et al. 1952, Coates et al. 1953), while others deny this (Ferebee 1953, see Deuschle et al. 1954). Carefully controlled trials, however, show that combined chemotherapy produces the best results (Medical Research Council 1952, 1953a and b) and that the best combination is streptomycin + isoniazid (Joiner et al. 1954, Carroll et al. 1955, Medical Research Council 1955). But the dosage schedules of the drugs must be sufficient, and where the combination is not successful (e.g., in that a large number of isoniazid-resistant bacilli can still be cultivated after treatment) it is probably because the streptomycin was given only twice a week (Ferebee 1953, Russell et al. 1955) so that there was too little to exert its protective effect with the isoniazid.

The problem of drug resistance and its relation to clinical effect is being extensively studied by bacteriologists. First, it should be noted that the rate of spontaneous mutation of tubercle bacilli to forms that are highly resistant to both streptomycin and isoniazid at the same time is extremely low (Middlebrook 1952, Mitchison 1954). After isoniazid therapy, Tison et al. (1954) found in 2 cases that organisms from one lesion were resistant to isoniazid while organisms from another lesion in the same case were susceptible to the drug. Fisher (1952) showed that isoniazid-resistant forms of tubercle bacilli would not grow in a simple synthetic medium but required an additional growth factor. Also, a proportion of isoniazid-resistant strains were of low virulence to laboratory animals, but complete absence of virulent bacilli was rare (Mitchison 1954). It should be noted that the organisms isolated by the elaborate technique of Hobby et al. (1954) from treated lesions were still fully susceptible to both streptomycin and isoniazid. It would seem fairest to leave the last word to those who claim (Mackaness and Smith 1953) that drug resistance as measured in vitro represents a metabolic change in the bacillus which is not necessarily reflected in conditions in vivo. So far we have no other widely accepted method of measuring this change more accurately than by the present resistance-tests, which are so difficult to standardise that results from different laboratories are hardly comparable. More hopefully, however, bacteriologists have shown synergism between streptomycin and isoniazid (Hobby et al. 1953, Mackaness and Smith 1953, Singh and Mitchison 1954)—probably by the drugs acting in different ways on the bacilli. This may explain the success of combined therapy.

Conclusions

Patients with recent lesions should be treated with a combination of chemotherapeutic drugs which includes isoniazid, to obtain resolution. The drugs should be used in their full therapeutic doses—i.e., isoniazid 200 mg. daily; streptomycin 1 g. daily; P.A.S. 10–20 g. daily. Diminished dosage scales should not be tried unless full-scale tests have shown them to be as effective, clinically, bacteriologically, and histologically, as the full scales already tested.

Patients with mixed old and recent lesions should receive similar treatment, to obtain as much resolution as possible. Resection of remaining lesions should be considered.

In patients with remaining lesions, three possible stages of open cavity walls must be considered:

(*a*) Lesions with completely healed walls but a persisting mechanical defect.

(*b*) Lesions with smoothly lined walls, which may or may not still contain caseated material with or without visible tubercle bacilli.

(*c*) Lesions with parts of the walls still rough, with fibrosis extending into caseated material, with or without visible tubercle bacilli.

Patients with lesions in group (*a*) are completely non-infective; those with lesions in group (*b*) may suddenly excrete tubercle bacilli to the danger of family or workmates without even having an exacerbation of their own tuberculosis (e.g., caseated material from a lung cavity may be coughed up in an attack of ordinary coryza); those with lesions in stage (*c*) are also possible sources of infection and, along with all patients with old lesions, require frequent observation for recrudescence. Further research should be undertaken to enable lesions in stage (*a*) to be distinguished from those in stages (*b*) and (*c*). Surely some serological test could be devised for this purpose. The tuberculin reaction will not help if there is a previous primary lesion, but it would be interesting to know whether the reaction is ever reversed after isoniazid treatment of primary lesions (e.g., in a young adult).

Further research should be undertaken to determine how latent organisms can be made susceptible to drugs, or to find out whether there is any cyclical rhythm in the metabolic state which enables the organisms to persist in the tissues, with a view to coördinating with this the duration of chemotherapy in chronic cases where excision is not practicable.

Summary

The difference between the changes in recent tuberculous lesions after therapy with a combination of drugs including isoniazid and those after a streptomycin combination suggests that isoniazid enables a toxic factor to be removed and real healing to occur.

The same difference is present early in the treatment of chronic lesions, enabling a larger proportion of lesions where isoniazid has been administered to attain a satisfactory quiescent stage.

Histological evidence is presented for the persistence throughout chemotherapy of dormant bacilli—i.e., bacilli which are in a state of metabolic inactivity, not reproducing, not susceptible to antibiotics, not necessarily capable of growth on ordinary media, perhaps not visible

on microscopy, but able to re-assume any or all of these properties.

Chemotherapy with a single drug leaves a considerable proportion of lesions active, probably by altering the metabolism of the organisms so that they are no longer affected by the drug. Testing in vitro for the sensitivity of the organisms to the drug (though the only method we have) is not a fully reliable index of this altered metabolic state. Streptomycin and isoniazid appear to affect the organisms' metabolism in different ways, and in full doses are apparently synergistic since the best healing of lesions is obtained with this combination.

This work has been possible only through the close clinical coöperation of Dr. M. A. Foulis, physician-superintendent, Mr. A. Jacobs and Mr. W. Borthwick, urological surgeons, and their colleagues at Robroyston Hospital. I am also deeply indebted to Dr. W. M. B. Davidson, of the department of pathology, Stobhill Hospital, for helpful criticism; and to Mr. Ian Mackie and Mrs. C. Neilson, of this department, for their photographic and secretarial assistance, respectively.

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COMPLICATIONS OF OXYTETRACYCLINE AND TETRACYCLINE THERAPY

RELATED TO A DEFINED TYPE OF RESISTANT STAPHYLOCOCCUS

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RECENT reports from Great Britain, France, and the U.S.A. have drawn attention to the occurrence, during antibiotic treatment, of complications attributed to antibiotic-resistant strains of staphylococci. These complications include gastro-enterocolitis, sore throat with scarlatiniform rash, sore throat without rash, balanitis with scarlatina, and urinary infection. Usually they have followed treatment with broad-spectrum antibiotics—chloramphenicol, chlortetracycline (aureomycin), oxytetracycline (terramycin), and tetracycline (see *Lancet* 1953, 1954).

The following questions arise:

1. Are they caused by staphylococcal infection?
2. Is a special type of staphylococcus responsible?
3. If so, does hospital cross-infection play any part?
4. What connection, if any, is there between the complications and the antibiotics?

A therapeutic trial of antibiotics in bacillary dysentery, at the Infectious Diseases Hospital in Dundee, enabled us to inquire into these points.

The Complications

The main complications associated with oxytetracycline and tetracycline treatment of bacillary dysentery are (*a*) "scarlet fever," (*b*) sore throat without rash, and (*c*) gastro-enteritis. Each has usually occurred alone, but occasionally gastro-enteritis has accompanied "scarlet fever" or sore throat without rash. As a rule they have appeared about the fourth or fifth day of treatment, but occasionally they have come on after its discontinuance: one patient developed the "scarlet fever" five days after ceasing to take the antibiotic. There were no deaths.

In the "scarlet fever" syndrome the temperature may reach 102–103°F. The face is flushed, with circumoral pallor, and the child looks ill. The rash is a punctate erythema, most pronounced on the trunk: it differs in no way from that of scarlet fever and is followed by desquamation. The soft palate and uvula are intensely congested and œdematous: at first there may be small vesicles but soon they are covered by a thin patchy white exudate, later becoming confluent, which may spread to the tonsils and over the buccal mucosa. The appearance may, indeed, resemble that of monilia infection. Sometimes ulceration is a feature.

In the cases with sore throat but no rash the general illness is less severe. The throat resembles that seen in the "scarlet fever" cases.

The mild gastro-enteritis is extremely difficult to differentiate from bacillary dysentery, and in this paper we take account only of the cases in which the symptoms were so severe as to suggest a staphylococcal rather than a dysenteric origin. The stools are frequent and fluid, often containing blood and mucus, and vomiting may be the predominant symptom.

Laboratory search was made for hæmolytic streptococci in all cases of the "scarlet fever" and sore-throat syndromes and for salmonella and shigella in the gastro-enteritis syndrome; but these organisms were never found.

TABLE I—COMPLICATIONS IN RELATION TO AGE

Age (years)	No. of cases	No. with complications	Percentage with complications
Under 1 ..	21	1	5
1–4	215	30	14
5–9	73	14	19
10–14	12	1	8
15 and over ..	57	2	3·5
All ages ..	378	48	12·7

The drugs used and their dosage were:

Oxytetracycline: 5 mg. per lb. body-weight, up to a maximum of 600 mg. daily.

Tetracycline A: 5 mg. per lb. body-weight; maximum 600 mg. daily.

Tetracycline B: 10 mg. per lb. body-weight; maximum 1000 mg. daily.

The drug was given for five consecutive days.

Table I shows that of 378 patients treated 48 (12·7%) had a complication. The incidence was low in those under a year old and in those fifteen years of age and over, but relatively high between one and nine years of age.

Table II arranges the complications in relation to the three antibiotics given. The differences do not seem to be substantial.

TABLE II—COMPLICATIONS IN RELATION TO ANTIBIOTIC USED

Complication	Oxytetracycline	Tetracycline A	Tetracycline B
"Scarlet fever" alone ..	2	1	1
Sore throat alone	2	6	5
Enteritis alone	1	11	6
Pyodermia alone	1	0	0
Vaginitis alone	1	0	0
Scarlet fever with enteritis ..	3	0	0
Sore throat with enteritis ..	2	1	3
Sore throat with pyodermia ..	0	1	0
Pyodermia with enteritis ..	0	0	1
No. with complications ..	12 (10%)	20 (15%)	16 (13%)
No. of cases treated	124	134	120

Laboratory Investigations

A survey for staphylococci was made in 15 cases of "scarlet fever" and "sore throat without rash" syndromes (hereafter called the sore-throat group) and in 18 cases of gastro-enteritis clinically attributed to treatment with the antibiotics. Our intensive bacteriological investigation did not start at the beginning of the therapeutic trial, and thus covered only the last 33 of the 48 cases in which complications arose. It included over the same period patients in the dysentery wards who did not show complications during treatment, and it was also extended to the nurses.

Methods

Selection of strains.—Specimens were taken on cotton-wool swabs from the nose, throat, or rectum. The primary isolation of staphylococci was carried out on 8% salt-agar. After forty-eight hours' incubation on this medium at 37°C a single pigmented colony was selected for examination for phosphatase production by the plate method (Barber and Kuper 1951) and for coagulase production by the tube method (Mackie and McCartney 1953). The selection of strains for "typing" was made from those which were both phosphatase and coagulase producers. The typing of the selected strain was based on an analysis of its antigenic structure by slide agglutination with absorbed antisera prepared from Hobbs types of staphylococci and on the results of "sensitivity testing" by the plate and tablet method.

Preparation of absorbed antisera.—Formalinised suspensions of Hobbs types of staphylococci (1948) were made from cultures harvested off 8% salt-agar plates. Twice-weekly intravenous injections were given to rabbits and these were bled out when the titres were satisfactory. The antisera were preserved with 0·5% carbolic acid.

Accepting the antigenic formulæ assigned to them by Oeding (1952, 1953a and b, 1954) cross-absorptions were done to obtain absorbed antisera on the same basis as Oeding, but always employing the Hobbs types. As a result, monospecific antisera were prepared to contain antibodies to antigens a, c, e, f, h, i, and k. A monospecific "b" antiserum could not be made from the combination of antigens in the Hobbs types, but this did not appear to be necessary since antigen b is present in all the Oeding types.

Slide agglutination tests with live suspensions of staphylococci were usually conducted with absorbed antisera diluted 1/100 although antigen k had to be used at 1/10 and was rather slow even at that strength, and antiserum c (being potent) was used at 1/150. Slide agglutination tests with the same suspensions after autoclaving (120°C for two and a half hours) were done with the antisera diluted 1/10 which was the dilution used when carrying out the antibody absorption technique.

The absorbed antisera were not used until they failed to agglutinate the absorbing strain even after ten minutes' exposure. In the tests with freshly isolated staphylococci, only agglutinations easily read after one minute's exposure were recorded.

In our experience Hobbs types 3, 4, and 12 had a common antigenic formula ac/- and these types could not be differentiated by the antisera used.

Antibiotic testing.—The sensitivity or resistance of the selected strain was tested by the agar plate and tablet method against seven antibiotics in the concentration of drug stated in parentheses against the name of each antibiotic mentioned, penicillin (2·5 units), chlortetracycline (100 μg.), chloramphenicol (100 μg.), oxytetracycline (100 μg.), streptomycin (80 μg.), erythromycin (10 μg.), and tetracycline (100 μg.). Except for erythromycin, a high concentration of each drug was used to save time and materials. The results were read after eighteen hours' incubation at 37°C. Strains were regarded as being resistant if there was growth up to the edge of the tablet, if there was a zone of inhibition not more than 2 mm. round the disc, and if in the zone of inhibition there were numerous resistant colonies.

"*Typing scheme.*"—The combined results of the antigenic analysis by slide agglutination and sensitivity testing were used to type each strain examined. For example ac/- POCST (pronounced "poxed") represents a strain which agglutinated with absorbed sera "a" and "c" (only) in the live state, which failed to agglutinate with absorbed sera in the autoclaved state (/-), and which was resistant to penicillin, oxytetracycline, chlortetracycline, streptomycin, and tetracycline (POCST).

Results

Table III shows the results of typing the strains of staphylococci isolated from 33 patients developing complications during the treatment of bacillary dysentery with oxytetracycline and tetracycline. It also includes, for comparison, the frequency of isolation of the above-defined type of staphylococcus (ac/- POCST) from patients similarly treated who did not suffer from complications during treatment, and from the nurses of the hospital. This latter figure is based on a single snapshot survey for carriers of nasal staphylococci among the nurses—a survey was made during the period when the complications were observed.

TABLE III—FREQUENCY OF DEFINED TYPE OF STAPHYLOCOCCUS (ac/- POCST)

Group	Source of specimen	No. of specimens	No. coagulase-positive	% coagulase-positive	No. of defined type	Others	Total	Defined type (%)
Sore-throat ..	Throat	15	8	53	7	1	8	87
	Nose	15	8	53	7	1	8	87
Gastro-enteritis ..	Fæces	18	10	55	6	4	10	60
	Nose	18	8	44	4	4	8	50
No complications	Fæces	317	85	27	14	71	85	16
	Nose	314	97	30	34	63	97	35
Nurses	Nose	64	31	48	3	28	31	10

The following points may be noted :

1. In the sore-throat series 8 out of 15 patients had a coagulase-positive staphylococcus on their throat-swabs, and in 7 of these it belonged to the type ac/- POCST.

2. In the gastro-enteritis series 10 out of 18 patients had a coagulase-positive staphylococcus on their rectal swabs, and in 6 of these it belonged to the type ac/- POCST.

3. In the dysentery-without-complications series 27 out of 317 patients had coagulase-positive staphylococci on their rectal swabs, and in 14 this belonged to type ac/- POCST.

4. 31 out of 64 nurses had a coagulase-positive staphylococcus on their nasal swabs, and in 3 this belonged to type ac/- POCST.

Thus the frequency of isolation of type ac/- POCST is lowest among the nurses (nose 10%) ; higher among the patients with no complications (nose 35%, rectal swabs 16%) ; much higher in the gastro-enteritis group (nose 50%, rectal swabs 60%) ; and highest in the sore-throat group (nose and throat 87%). We may add that of the nurses yielding this organism 1 was a sister in a dysentery ward and 2 had been on duty in dysentery wards for two months in the early part of the period when complications were occurring.

Discussion

The close association of our defined type of staphylococcus (ac/- POCST) with the cases showing complications during treatment is strong presumptive evidence that it was the organism responsible for them. Two difficulties, however, call for explanation : (1) the failure to isolate it from some of the cases showing complications, and (2) its presence in many patients in the dysentery wards who did not show complications. The first difficulty may merely be an expression of the selection which inevitably operates when single colonies are picked from the culture-plate at primary isolation. The second difficulty is more theoretical than actual, for in communicable disease the carrier-rate is often higher than the incidence of illness. The presence of the organism in three nurses, all of whom had worked in the dysentery wards but had not received antibiotics, is evidence that at some stage cross-infection had taken place.

How then does one explain the observed relation between treatment and the onset of the complications ? On this point we can produce little satisfactory evidence. It is worth noting, however, that in many cases the complications started on the fourth or fifth day of treatment. In new admissions to a hospital ward we have observed a high incidence of cross-infection of nasal staphylococci during the first week of residence in the ward (unpublished data). It may well be that (as has been suggested) after cross-infection the cross-infecting strain of staphylococcus is able to multiply rapidly when the organisms which form the normal flora are inhibited by an antibiotic.

If, as we believe, the complications of treatment with broad-spectrum antibiotics are but one more manifestation of staphylococcal cross-infection, what can be done to control such cross-infection ? This is a big subject, but perhaps we should indicate the lines along which we are thinking.

The old axiom " know malaria and all other things epidemiological will be added unto you " can be applied in discussing " hospital epidemiology " in general and staphylococcal cross-infection in particular. *The* fundamental principle of malaria control is *species* sanitation. Christophers (1902) developed this concept as the result of his failure to control malaria at Mian Mir by general anopheline control. He showed that the control of anophelines in general was a nigh impossible task, but that the control of the vector species was a reasonable proposition. It may well be that classification of the genus staphylococcus is the key to the control of staphylococcal cross-infection in hospitals.

The success of the present study depended on our scheme of typing, and the control of staphylococcal cross-infection may depend not on the search for staphylococcal carriers in general but on the recognition of carriers of defined types of proven pathogenicity, of which ac/- POCST seems to be one. This we would call " type " sanitation.

Summary

During treatment of bacillary dysentery with oxytetracycline and tetracycline some of the patients showed complications—notably " scarlet fever," sore throat without rash, and gastro-enteritis.

These complications seem to have been caused by cross-infection with a " hospital " staphylococcus of defined type.

The term ac/- POCST (pronounced " poxed "), applied to this type, implies that it is agglutinated by absorbed sera " a " and " c " (only) in the live state, is not agglutinated by absorbed sera in the autoclaved state, and is resistant to penicillin, oxytetracycline, chlortetracycline, streptomycin, and tetracycline.

We wish to express our thanks to Prof. W. J. Tulloch for encouragement ; to Dr. Mary Kerr for help in the clinical studies ; to Mr. H. Lawrence, A.I.M.L.T., for technical assistance ; and to the Medical Research Council for an expenses grant to one of us (T. S.) for a technician.

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APLASTIC ANÆMIA AND MYELOID LEUKÆMIA AFTER IRRADIATION OF THE VERTEBRAL COLUMN *

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Ionizing radiation is the only external agent that has been conclusively shown to be leukemogenic for man.
KAPLAN (1954).

IN ankylosing spondylitis X-ray treatment is one of the most reliable means of combating discomfort and pain. In osteo-arthritis and other rheumatic disorders of the spine radiotherapy has a far less dramatic effect, but it is still widely used. As for its therapeutic value and its capacity to arrest these diseases, the existing data even for spondylitis are confusing. Desmarais (1953) concluded that in spondylitis " we can see little evidence so far that deep X-ray materially alters the evolution of the disease."

When other measures have failed it is not unreasonable to try radiotherapy, provided this therapy is relatively harmless. But the occurrence of seven cases, reported here, in which there was a fatal hæmatological complication, probably due to X-rays, suggests that careful thought is needed before radiotherapy is started. On the basis of this experience, I disagree with Desmarais, who stated that with a dose of 1200–1500r there is almost no danger of affecting skin and marrow ; for severe involvement of the marrow may manifest itself many years later.

* In this paper Dr. van Swaay gives an account of the cases in Holland referred to by Dr. W. M. Court Brown and Dr. J. D. Abbatt in their recent article (*Lancet*, 1955, i, 1283).—ED. L.

At necropsy in four cases of ankylosing spondylitis it was found that each of the four patients had had courses of X-ray treatment and that all had died from myeloid leukæmia. Blood examination before radiotherapy had been essentially normal. In Holland seven cases with fatal hæmatological complications have been collected. Six such cases have been published previously: Johnson (1945) and Sharp and Easson (1954) each described a case complicated by aplastic anæmia; Graham (1948) described two cases complicated by leukæmia, and Kuzell et al. (1952 and personal communication) a third; Ragan (personal communication) has seen myeloid leukæmia in a spondylitic who had received yearly courses of radiotherapy.

In other diseases the hazards of the influence of radioactivity on blood-forming organs are well recognised. Moeschlin et al. (1953) describe a case of fatal aplasia of all blood elements seven years after a diagnostic thorium-dioxide injection, and they remark on several analogous reported cases. Dameshek (1954) considers that X-ray therapy for hyperplasia of the thymus may have been the cause of acute leukæmia in three children, and in polycythæmia vera the incidence of acute leukæmia seems to be distinctly greater in patients who have been treated with radioactive phosphorus than in those who have not. In dermatology, too, hæmatological complications are believed to follow X-ray therapy; LeDonne (1954) describes myelogenous leukæmia in a patient with mycosis fungoides, and mentions another patient with this disease who died of aplastic anæmia. MacKee and Cipollaro (1946) referred to the possibility of leukæmia after prolonged irradiation, and Lynch (1951) records a case of death from acute myelogenous leukæmia in a patient who had received X-ray treatment for psoriasis.

Case-records

Case 1.—A male office clerk, aged 25, with a three-year history of back pain. Radiographically the sacro-iliac joints showed typical lesions of ankylosing spondylitis. Radiotherapy was given over a four-year period. The total dose on each portal was: spine I (cranial) 500r, spine II 200r, spine III 1300r, spine IV 1200r, spine V (caudal) 1500r, left hip 200r, sternoclavicular joints 600r. Physical factors: 180 kV, 3 mA, 0·5 mm. Cu-filter, focus-skin distance 40 cm. Leucocytes were normal during therapy. Six years after the last course of X-ray therapy acute myeloid leukæmia developed, with 146,000 white blood-cells (mostly myelocytes) per c.mm. Three months later, after radiotherapy of the enlarged spleen, the patient died of aplastic anæmia. Necropsy was performed.

Two brothers of this patient also have ankylosing spondylitis, and one was treated with analogous X-ray therapy more than ten years ago. Both are in relatively good health now, and have a normal blood picture.

Case 2.—A male postal worker, aged 46, with a twenty-six-years history of ankylosing spondylitis. The sacro-iliac joints were fused and a typical "bamboo-spine" was found radiographically. Radiotherapy of the spine and sacro-iliac joints was given over a two-year period. The total dose was: spine I (cranial) 1650r, spine II 2400r, spine III 2600r, spine IV and V (caudal) 2000r, sacro-iliac joints 1100r, hips 600r. Physical factors: 150r over each portal; 180 kV, 15 mA, 0·5 mm. Cu-filter, focus-skin distance 30 cm.; each portal 10 × 15 cm. was treated for 110 seconds two or three times on different days during each course. One year after the last X-ray therapy amidopyrine was given for four weeks, without effect on the leucocytes; no other hæmatotoxic drugs were administered. One year later a fatal aplastic anæmia with extreme bone-marrow depression developed. Necropsy was performed.

Case 3.—A bricklayer, aged 41, with a five-year history of ankylosing spondylitis. Both sacro-iliac joints were fused. Courses of X-ray therapy were given over an eight-month period. The total dose was: spine I, II, and III each 1600r; spine IV and V (caudal) 800r; sacro-iliac joints 400r. Thereafter the patient was well and at work without any medical treatment. Two years later petechial bleeding occurred as a symptom of myeloblastic leukæmia (white blood-cells 23,500 per c.mm.). Bone-marrow aspiration confirmed the diagnosis. The patient died within two weeks. Necropsy was performed.

Case 4.—A 55-year-old man with a ten-year history of lumbar pain was treated as a case of ankylosing spondylitis. Two courses of radiotherapy were given to the whole spine with an interval of three months. The total dose on each portal was 900r. Fifteen weeks later aplastic anæmia developed; this was followed ten weeks later by acute myeloid leukæmia from which the patient died. At necropsy the clinical diagnosis of ankylosing spondylitis was corrected to osteo-arthritis of the spine.

Case 5.—A docker, aged 58, with a rigid spine typical of ankylosing spondylitis and with peripheral-joint involvement. Radiotherapy was given over a ten-month period. The total dose was: spine I (cranial) 1950r, spine II 1650r, spine III 1450r, spine IV 1250r, spine V (caudal) 1100r, sacro-iliac joints 200r, peripheral joints 1000r, shoulders 2350 and 3000r. During each course of X-ray therapy the number of white blood-cells fell to 2500 per c.mm., returning gradually to normal in the intervals. Three months after radiotherapy ended, administration of gold therapy was started, and this was continued to a total dose of 1600 mg. Aplastic anæmia developed, of which the patient died twelve months after the last X-ray therapy. Although gold probably had some influence, previously the radiotherapy had seriously affected the bone-marrow.

Case 6.—A man, aged 56, had a completely rigid spine, typical of ankylosing spondylitis. The total dose of X-ray therapy during a four-year period was: spine I (cranial) 700r, spine II 2800r, spine III 4300r, spine IV 5950r, spine V (caudal) 3450r, right shoulder 1800r, sacro-iliac joints 3450r, knees 150r. Ten weeks after the last X-ray treatment he died of myeloblastic leukæmia. Necropsy was performed.

Case 7.—A woman, aged 62, had a rigid spine typical of ankylosing spondylitis, and both hip-joints were severely involved. The ankylosing spondylitis was treated with two courses of X-ray therapy with a six-month interval. The total dose on the whole spine except the neck was 900r. Twenty-nine months after the last radiotherapy she died from myeloid leukæmia. Necropsy was performed.

Data on these seven cases are shown in the accompanying table.

DATA ON SEVEN CASES IN WHICH RADIOTHERAPY OF SPINE WAS FOLLOWED BY BLOOD DYSCRASIA

Case no.	Age (yr.) at which radiotherapy given	Age (yr.) at death	Latent interval	Maximum dose (r) on one portal	Diagnosis
1	25–29	36	6 yr.	1500	Myeloid leukæmia
2	46–48	49	2 yr.	2600	Aplastic anæmia
3	41	43	2 yr.	1600	Myeloid leukæmia
4	55	56	5 mos.	900	Myeloid leukæmia
5	58	59	1 yr.	1950	Aplastic anæmia
6	56–60	61	2¼ mos.	5950	Myeloid leukæmia
7	62	64	2½ yr.	900	Myeloid leukæmia

Discussion

Aplastic anæmia sometimes precedes leukæmia, and distinct separation of these diseases is often impossible. Young et al. (1951) describe an extreme example of disorderly erythropoiesis, with sixteen months of bizarre anæmia preceding leukæmia. Segerdahl (1934), Voit and Landes (1938), and Fontein (1945) described patients with aplastic anæmia terminating in myeloid leukæmia, as in the present case 4.

The incidence of leukæmia in the general population is about 1 : 25000 (Folley et al. 1952). It therefore is not very likely that the onset of leukæmia in the cases described here is a chance occurrence. It seems evident that there must exist some relation between either ankylosing spondylitis or radiotherapy on the one hand and blood dyscrasia on the other. Statistical analysis has not yet been feasible because the data were collected from different centres and the total number of treated

patients in these centres is not known, nor is the cause of death of many other spondylitics; and several cases were registered in more than one clinic. It is unlikely that other hæmopoietotoxic agents, such as benzol, pyridine, aniline-dyes, indol, or tar, played any part in these cases.

An extensive study of reported work (van Swaay 1950) did not reveal any record of leukæmia in ankylosing spondylitis, except when radiotherapy had been given. On the other hand leukæmia and/or aplastic anæmia can be induced by exposure to radioactivity. Nielsen (1932) considered 16 cases of leukæmia in X-ray and radium workers, but concluded that the incidence was not convincingly higher than in any other occupation. Furth and Furth (1936) stated that the incidence of myelogenous leukæmia may be enhanced by X-irradiation. More recent publications leave no doubt that there may exist a causal relation between exposure to radioactivity and the development of leukæmia. The relation to aplastic anæmia was established many years ago, notably through cases from a New Jersey plant where radioactive luminous paint had been used (Martland 1931).

In Hiroshima and Nagasaki the number of deaths from leukæmia in the years 1948–50 was significantly higher in the more exposed groups; in people who had been within a range of 1000 m. from the explosion hypocentre the leukæmia-rate was forty times higher than in people beyond 2000 m. (Folley et al. 1952). The rate of leukæmia amongst physicians and radiologists has been repeatedly studied (Levent 1932, Henshaw and Hawkins 1944, Dublin and Spiegelman 1948). March (1950) confirmed that the incidence of leukæmia among radiologists was abnormally high—even higher than Levent had postulated in 1932, the rate being about nine times as high as among other physicians. In 1952 Peller and Pick found an even higher incidence in young radiologists.

In most of these reported cases as in five of the six cases of leukæmia reported here, the leukæmia developed within five years after the exposure; but often longer periods of latency are observed, as in our first case.

Summary

Seven cases are described in which radiotherapy for disorders of the vertebral column was followed by fatal blood dyscrasia. Only one patient received an excessive dose of X rays.

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TESTING APPARATUS FOR INTERMITTENT POSITIVE-PRESSURE RESPIRATION

INFLUENCE OF INSPIRATORY PRESSURE WAVE-FORM

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ARTIFICIAL respiration by intermittent positive pressure, introduced for treating poliomyelitis (Lassen 1953), has proved life-saving not only in that condition but also in polyneuritis of the Landry type (Smith et al. 1954, Harries and Lawes 1955, Bendz 1955) and in tetanus (Bjørneboe et al. 1953, Honey et al. 1954, Shackleton 1954, Lassen et al. 1954).

Mechanical devices of widely different characteristics have been introduced to provide intermittent positive pressure (Bang 1953, Beaver 1953, Macrae et al. 1953, Russell and Schuster 1953, Engstrom 1954), but their comparative merits and disadvantages have not yet been clearly expounded. Complete clinical testing may be difficult and in the case of very ill patients unjustifiable; so reliance has hitherto been placed on unspecified clinical impressions.

The need for a laboratory standard for testing apparatus has been pointed out by Galpine and Smith-Clarke (1955). At least one apparatus could not provide the minimum of ventilation required by some patients, but was widely distributed before this was found out; laboratory testing would prevent this dangerous state of affairs.

We describe here a simple apparatus which, for this purpose, simulates the chest of a paralysed patient, and we report investigations made with its aid into the effect of varying the wave-form of the inspiratory pressure.

Laboratory Testing

It has previously been shown that the tidal volume of a paralysed patient receiving artificial respiration by intermittent positive pressure is directly proportional to the inspiratory pressure at the tracheal tube but not directly proportional to the duration of inspiration (Spalding 1955). Fig. 1 (points X) illustrates the relation of tidal volume to duration of inspiration in a severely paralysed young adult man whose lungs were healthy. The positive pressure was provided by the power unit of a Monaghan portable respirator, which is designed for use with a cuirass but can supply positive as well as negative pressure. The tidal volume was measured by collecting the expired air from a valve of similar design to that described by Galpine and Smith-Clarke (1955).

It will be shown below (fig. 1, points ● and ○) that, by using this valve and the Monaghan power unit, the tidal volume can be measured with a very satisfactory degree of accuracy, although with other sources of positive pressure this method may be much less accurate.

The curves in fig. 1 are a guide to the type of mechanism which should be used as a model of the lung. In the first place, for inspiration of any given duration (t) the tidal volume (V) is proportional to the peak pressure (p). It follows that, when the lungs are inflated they behave like a piston moving in a cylinder against a spring with no appreciable friction or inertia. In the second place, the shape of the V–t curves would be given by a constriction impeding the flow of air into the cylinder. Provided that the constriction is such that the flow of air is streamline rather than turbulent it need not disturb the proportionality of p and V.

A model consisting of a constriction and what is in effect a spring-loaded piston can be made to reproduce very closely the behaviour of the lungs of a patient. The

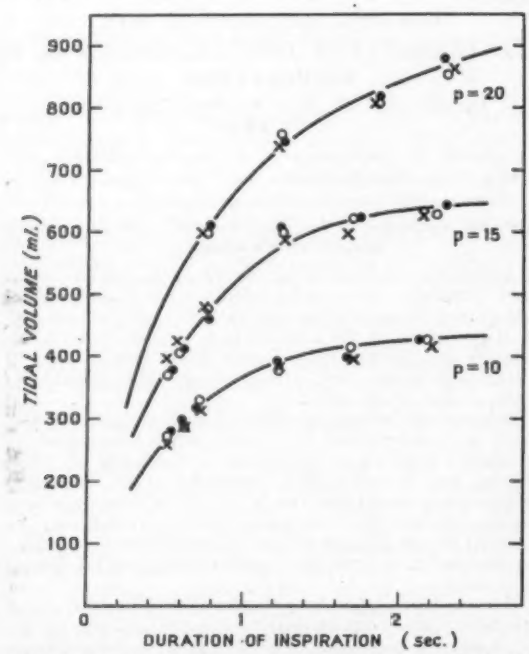

Fig. 1—Relationship of tidal volume (V) to duration of inspiration (t). Peak pressure (p) in cm. water is given for each curve. Points were obtained as follows: X by measuring expired air from a severely paralysed patient; ● by measuring "expired air" from the model; and ○ by calculating tidal volume from pressure in rigid vessel of the model.

model is shown schematically in fig. 2, and consists of two main parts, A and B. A is the constriction, provided by many narrow tubes in parallel. The length and diameter of the tubes are chosen to ensure streamline flow at the maximal rate of air-flow deduced from fig. 1. The number of tubes in use is adjusted by sliding a plunger to give the resistance required.

B is a rigid vessel. When air is blown into it, the increase in internal pressure simulates the compressed spring of the piston-and-cylinder analogy mentioned above, and complications due to friction and inertia are eliminated. The strength of the "spring" is determined by the size of the air-space, which can be reduced as necessary by adding water to the vessel. It should be emphasised that the volume of the air-space represents the elasticity of the chest and not the tidal volume or the vital capacity.

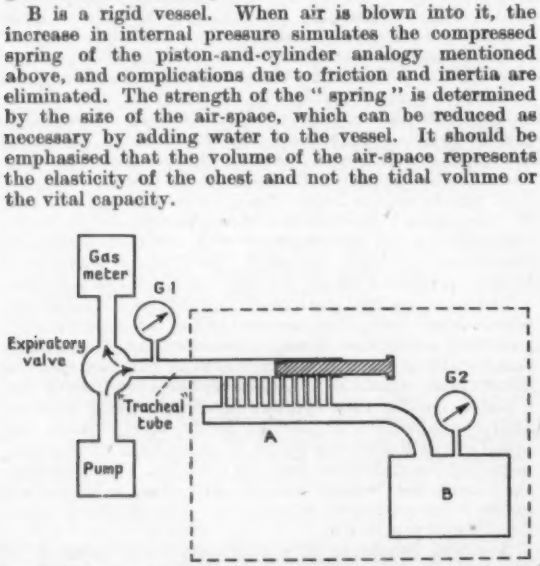

Fig. 2—Model lung (within interrupted lines): A, constriction formed by narrow tubes in parallel; B, rigid vessel; G1, G2, pressure gauges.

The pressure is measured with a bourdon-type gauge (G1 in fig. 2) placed before the constriction. This gauge was checked statically against a water column and in rapid motion by reference to a quick-acting bellows manometer (East and Kahn 1946) which itself has been calibrated statically against a water column. The maximal error of p is thought to be less than 0·5 cm. water at all pressures.

The "tidal volume" V can be measured in two ways: (1) the "expired air" is measured with a spirometer or gas meter, as is done clinically; and (2) V is calculated from the rise of pressure in the rigid vessel measured on gauge G2 (fig. 2). Measurements by both methods are shown in fig. 1 (points ● and ○), and their agreement shows that, with this apparatus, collection of the expired air gave an accurate estimate of V.

Results obtained with such a model are shown in fig. 1. The constriction and the volume of air in the rigid vessel were arranged to reproduce the results obtained from the patient with a peak pressure of 15 cm. water. For this the constriction consisted of 27 tubes 2 cm. long and about 1·7 mm. in diameter, and the rigid vessel contained 43·5 litres of air. The agreement between the data from the patient and the model is good at all values of p, V, and t investigated. This provides further evidence that the assumptions made about the behaviour of the lungs are justified.

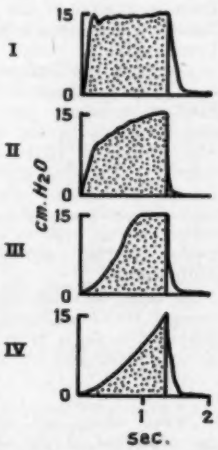

Fig. 3—Pressure wave-forms at external end of "tracheal tube": I Radcliffe respiration pump (Russell and Schuster 1953); II, Monaghan portable respirator used as described in text; III, Beaver respirator; and IV, specially designed apparatus. Inspiratory period is stippled.

Inspiratory Pressure Wave-form

Clinical investigations have shown that, with the same values of p, different types of pump give different relations between V and t. The model was used to investigate the relationship between V and the inspiratory pressure wave-form produced by various types of pump. The wave-forms studied are shown in fig. 3 and the corresponding V–t curves in fig. 4. The values of V were obtained by calculation from the rise of pressure within the rigid vessel. Although measurements were also made by collecting the "expired air" they were not accurately reproducible with pumps I and III; with these pumps there was too little negative pressure applied to the valve in expiration to operate it properly. Nevertheless V–t curves obtained in this less reliable way both on the patient and with the model were in the same relative positions as those in fig. 4.

Discussion

The different V–t curves shown in fig. 4 can be qualitatively deduced from the different wave-forms from which they were obtained. The rate at which air passes through a constriction in which flow is streamline is very closely proportional to the pressure difference across it. For a given value of p the pressure difference across the constriction, or, in the patient, between the trachea and the alveoli, is greatest at the beginning of inspiration. It follows that a wave-form which provides the maximal tracheal pressure at the beginning of inspiration enables a given tidal volume to be introduced in the shortest time.

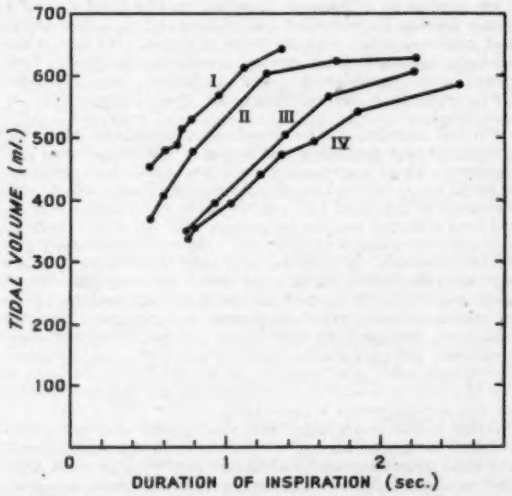

Fig. 4—Relationship of "tidal volume" to duration of inspiration with different wave-forms. Peak pressure throughout was 15 cm. water.

During inspiration the intrathoracic pressure in a healthy person is negative, but it is positive in a person receiving artificial respiration by intermittent positive pressure. In selecting the wave-form most suitable for artificial respiration by intermittent positive pressure we must consider the physiological effects of this reversal of pressure.

Artificial respiration, whether by intermittent positive pressure or in a tank respirator (Maloney and Whittenberger 1951), imposes on the circulation a strain due to a reduction in the pressure gradient which normally causes blood to flow from the veins to the right side of the heart. Apparatus for artificial respiration should therefore not only provide adequate ventilation but also impose a minimal strain on the circulation. This is especially important since the acutely sick patient may lose his ability to compensate for interference with the circulation. To minimise the strain on the circulation two requirements must be fulfilled: (1) the duration of expiration must be as long as possible, for during this period an increase in the cardiac output makes up for the decrease during inspiration; and (2) the mean pressure in the face-mask, or in this case at the tracheal tube, must be as small as possible (Werkö 1947, Cournand et al. 1948, Motley et al. 1948).

Figs. 3 and 4 show that a tidal volume of 500 ml. can be provided in 0·7 sec. by the pressure wave-form of type I ("square wave"), but that with wave-form IV (gradual rise of pressure) 1·6 sec. is required for the same tidal volume. Since inspiration is less than half as long with wave-form I as with wave-form IV, it is clear that the first requirement, a long period of expiration, can be provided better when wave-form I is used.

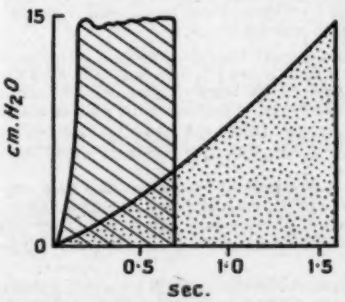

Fig. 5—Inspiratory pressure wave-forms required to provide tidal volume 500 ml. Inspiration lasts less than half as long with "square" curve, and mean pressure is lower.

Fig. 5 shows the inspiratory pressure wave-forms of types I and IV which are required to give a tidal volume of 500 ml. The mean pressure with wave-form I is 84% of that with wave-form IV; therefore wave-form I fulfils the second requirement better than does wave-form IV.

It may therefore be concluded that apparatus for prolonged artificial respiration by intermittent positive pressure should be designed to give a "square" wave-form. This is achieved by a rapid onset to the pressure curve, and a gradual rise at the beginning of inspiration should be avoided. Experiments on animals point to a similar conclusion (Maloney and Handford 1954).

Clinical Results

Experience in testing ten consecutive paralysed patients with intermittent positive-pressure respiration since August, 1953, indicates that a square wave-form is clinically satisfactory and comfortable for the patient. A pressure wave-form of type I (fig. 3), derived from a Radcliffe Respiration Pump (Russell and Schuster 1953) or similar gravity-operated pump, was used in all cases, and, except in the first case, duration of inspiration was about 0·85–1·10 sec. at respiratory rates of 13–22 a minute. The results of treatment are shown in the accompanying table. Only one of the ten patients died while receiving artificial respiration, and her death was attributable to an intense hæmorrhagic consolidation of five-sixths of the lungs, due to inhalation of vomit before coming under treatment.

CLINICAL RESULTS WITH PRESSURE WAVE-FORM OF TYPE I

Case	Age (yr.)	Diagnosis	Duration of treatment with I.P.P. respiration	Result
1	16	Acute toxic polyneuritis	4 weeks	Complete recovery
2	13	Poliomyelitis	Till death after 22 hr.	Died after 22 hr. from effects of previously inhaled vomit
3	17	Polyneuritis following glandular fever	2½ weeks	Complete recovery
4	32	Poliomyelitis	7 weeks	Died 10 weeks after cessation of I.P.P. respiration
5	42	Tetanus (heavily curarised)	6½ days	Complete recovery
6	35	Poliomyelitis	3 weeks	Died 17 days after cessation of I.P.P. respiration
7	19	Poliomyelitis	Continues after 12 mos.	Very severely paralysed
8	33	Poliomyelitis	7 mos.	Severely paralysed
9	58	Acute toxic polyneuritis	Continues after 13 weeks	Gradually recovering
10	7	Acute toxic polyneuritis	4½ weeks	Almost complete recovery

Cases 1–4 were reported in detail by Smith et al. (1954), case 5 by Honey et al. (1954), and case 8 by Harries and Lawes (1955).

Summary

Apparatus for providing artificial respiration by intermittent positive pressure must be thoroughly tested before being approved for clinical use.

A "model lung" is described which is suitable for the laboratory testing of such apparatus.

Investigations made with this model and clinically demonstrate the advantages of a square pressure wave-form for the inspiratory phase.

I am grateful for valuable advice from Dr. Ritchie Russell, director of the Respiration Unit in Oxford, and Dr. Crampton Smith, who has contributed so much to the survival of the patients.

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TREATMENT OF TETANUS WITH CHLORPROMAZINE AND NITROUS-OXIDE ANÆSTHESIA

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SINCE Lassen (1952) began treating bulbar poliomyelitis by tracheotomy and intermittent positive-pressure respiration (I.P.P.R.) there have been reports of seven cases of tetanus treated along similar lines, complete paralysis being induced by muscle-relaxant drugs (see accompanying table, cf. Bodman 1954). The table shows

DATA ON SEVEN REPORTED CASES OF TETANUS TREATED BY I.P.P.R.

Source	Sex	Age (yr.)	Incubation period (days)	Period of onset (days)	Outcome
Woolmer and Cates (1952)	F	58	1	3–4	Recovered
Forrester (1954) ..	M	42	5	3	,,
Honey et al. (1954)	M	42	7	3	,,
Lassen et al. (1954)	M	10	5	3	,,
,,	M	11	11	4	,,
,,	M	50	9	3	,,
,,	M	15	4	1	Died

that in only one case was the period of onset less than three days, and this was the patient that died.

The method of treatment followed by these workers has two serious disadvantages. First, it is difficult to maintain correct respiratory exchange by artificial means. Secondly, the profuse bronchial secretions, which are a feature of the disease, are probably increased by a tracheotomy. Accordingly we have approached the problem differently. In a case of generalised tetanus we have administered chlorpromazine, promethazine, pethidine, and nitrous-oxide/oxygen anæsthesia. The patient survived for twelve days; but despite the fatal outcome we think that the details of the method are worth recording.

Case-record

A boy, aged 9 years, suffered a deep laceration of his knee; this was sutured, but he was not given antitetanic serum. After seven days he complained of stiffness in the neck and jaw; and the first generalised convulsion occurred twenty-one hours later.

He was admitted to another hospital on the second day of his illness. There he was given 200,000 units of tetanus antitoxin and penicillin, and was sedated with paraldehyde and pethidine.

On arrival at Hillingdon Hospital on the third day of his illness he was having mild convulsions lasting a few seconds and repeated every two to three minutes. He was relaxed between spasms and his general condition was good. Treatment with paraldehyde and pethidine was continued for twenty-four hours, but the convulsions were not controlled.

On the morning of the fourth day, treatment with chlorpromazine and pethidine was begun. The drugs were given separately in 25 mg. doses p.r.n. Each dose prevented convulsions and produced flaccidity for a half to one hour. After twenty-four hours of this régime tone was present and convulsions occurred despite treatment. On the fifth day he had a major convulsion with cyanosis. He was immediately given suxamethonium, an endotracheal tube was inserted, and he was anæsthetised with nitrous oxide and oxygen. At this stage we intended to perform tracheotomy and to proceed to treatment with muscle relaxants and I.P.P.R. While this was being arranged we noted that the boy remained flaccid and there were no further convulsions, but tone returned if the nitrous oxide was stopped; so we decided to continue this line of treatment, and we substituted for the endotracheal tube an oral airway under a face-mask.

After some hours tone returned again and minor convulsions occurred, owing, we believed, to the withdrawal of the chlorpromazine and pethidine. We then gave 25 mg. of each of these drugs intravenously every four hours, in addition to the nitrous oxide. Promethazine 25 mg. was given intramuscularly every eight hours. With this régime convulsions were controlled and the patient remained flaccid, although there was some recurrence of tone about three hours after each dose of the drugs.

Every two hours the oral airway was changed, secretions were aspirated from the mouth and pharynx, and the posture was altered. These movements, and possibly the withdrawal of nitrous oxide, provoked a convulsion with cyanosis on about a third of the occasions on which they were undertaken. In an attempt to overcome this difficulty, suxamethonium was administered and artificial ventilation applied at these times. This had the effect of delaying the convulsion; but laryngeal spasm occurred as the effect of the suxamethonium wore off; and this prevented inflation in the period when spontaneous respiratory movements were inadequate. Cyanosis followed and persisted longer than when the relaxant was not used. On one occasion gallamine was tried, with even more unsatisfactory results.

Since these episodes were relatively infrequent and the patient's general condition did not seem to be seriously affected by them, the treatment was continued until, on the morning of the twelfth day, while being turned and having secretions aspirated, the patient had a more than usually lengthy convulsion, became severely anoxic, and died some thirty minutes later.

At necropsy both lungs showed extensive recent collapse, which was not due to bronchial obstruction. The right ventricle was enormously dilated.

Further Data

Clinical and Laboratory Findings.—The pulse-rate varied from 100 to 120 per minute; body-temperature 97–98°F. Urine was voided spontaneously, and its volume was well maintained. The patient was not catheterised once we had satisfied ourselves that there was no retention with overflow. Urine was normal throughout by routine ward tests. Blood electrolytes were always within normal limits.

Supervision and Nursing.—An anæsthetist was in attendance throughout the twenty-four hours; a bed was provided for him in an adjoining room. The patient was nursed, naked and uncovered, in the semi-prone position with pillows under the hips. He was turned from one side to the other every two hours during the day and every four hours at night.

Feeding and Fluids.—The patient was given the diet suggested by Higgins et al. (1954), via a Ryle's tube. In addition, 2–3 litres of 5% glucose, physiological saline, and Darrow's solution in various combinations were given daily by intravenous drip.

Administration of Gases.—Nitrous oxide 6 litres per minute and oxygen 2 litres per minute were given from a Boyle's apparatus, by a semi-closed circuit. The delivery tube was connected directly to a modified oral airway—an arrangement which proved to be more convenient than a face-mask. Secre-

DR. SPALDING, DR. YOUNG: REFERENCES—*continued*

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tions, which were scanty and easily removed, were aspirated from the mouth when changing the airway. A 2000-gallon cylinder of nitrous oxide and a 120-c.ft. cylinder of oxygen were coupled to the apparatus. These lasted approximately twenty-four hours, and no difficulty was experienced in keeping up a continuous supply. A humidifier (Marshall and Spalding 1953) set to 70°F was used. Higher settings caused overheating of the patient.

Other Treatment.—Penicillin 500,000 units was given intramuscularly twice daily. A further 500,000 units of tetanus antitoxin was given on the seventh day.

Discussion

In this very severe case of tetanus chlorpromazine, promethazine, and pethidine, together with nitrous-oxide and oxygen anæsthesia completely controlled the convulsions without impairing adequate spontaneous respiration. Withdrawal of the nitrous oxide resulted in the reappearance of convulsions within two or three minutes; withdrawal of the basal sedation had the same effect after some hours.

The virtual absence of secretions in the trachea and bronchi was a remarkable feature. The peripheral lung-fields remained clear throughout; the collapse found at necropsy was probably a terminal event. The lack of excessive secretions was, we believe, due to the pharmacological effects of chlorpromazine and promethazine and the absence of a tracheotomy.

We failed to devise a method of changing the airway and turning the patient without sometimes provoking a convulsion. This finally caused the patient's death. It might be argued that we could have overcome this difficulty by a tracheotomy, and this was constantly borne in mind. It would certainly have enabled us to avoid the anoxic episodes caused by laryngeal spasm which occurred as the effect of the suxamethonium wore off, but the spasm of the respiratory muscles might still have interfered with inflation. This consideration, combined with the known complications of tracheotomy, such as increased secretions, blockage of the tube, hæmorrhage, infection, and ulceration of the trachea, made us decide to carry on without a tracheotomy—a course that seemed to be justified by the long periods during which our treatment was entirely satisfactory.

The prognosis in this case, with a period of onset of twenty-one hours, must have been hopeless with orthodox treatment; and indeed we think it unlikely that a case of such severity has ever survived. The use of relaxants and continuous I.P.P.R. has improved the prospects of survival in severe cases of tetanus. But, as we have pointed out, of the seven reported cases treated in this way, the most severe had the shortest period of onset and did not survive.

Summary

A very severe case of tetanus was treated with chlorpromazine, pethidine, and promethazine combined with nitrous-oxide/oxygen anæsthesia. This controlled the convulsions and virtually eliminated the problem of secretions in the chest. Continuous curarisation was unnecessary; and the patient breathed spontaneously throughout: He died on the twelfth day of his illness.

We are indebted to the respiratory unit at the Radcliffe Infirmary, Oxford, for the loan of the humidifier.

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Reviews of Books

Congenital Syphilis

DAVID NABARRO, M.D., F.R.C.P., consulting pathologist, formerly director of the pathological department, The Hospital for Sick Children, London. London: Edward Arnold. 1954. Pp. 470. 50*s*.

FROM 1917 to 1939 Dr. Nabarro had charge of the venereal-diseases clinic at the Hospital for Sick Children, Great Ormond Street, and through most of his medical life he has been a leader in the attempt to prevent the distressing congenital infection of which he saw so much. To an extent for which even he could hardly hope, this attempt has succeeded; and in consequence this book, based on his wide experience, describes a disease much more severe and with more serious sequelæ than is commonly seen in this country today. But syphilis is very far from being a thing of the past, even in these islands; and Dr. Nabarro does a valuable service by describing so fully the natural history and manifestations of the disease as transmitted to children. His interesting opening chapter on the historical background has evidently entailed a great deal of research. The section on transmission is a little disappointing in that, though various hypotheses are outlined, the author does not give his personal views. The clinical picture, however, is described very fully, and illustrated with his own cases, an extensive bibliography being added. He puts the likelihood of third-generation syphilis higher than would most other clinicians: the passing of infection to a third generation is very difficult to prove, since in the first-generation congenital syphilitic the disease may cure itself spontaneously and the patient acquire syphilis, producing not a third-generation syphilitic but a second. In what is so largely a retrospective work it is perhaps inevitable that the survey of treatment should be less instructive than the other parts; and it does not take account of the fact that penicillin has almost supplanted all the arsenicals in the majority of treatment centres in this country. But, if these are shortcomings, they are small in relation to the rest; and the book can be recommended both to students and practitioners as the standard work on its subject.

The Lung

Clinical Physiology and Pulmonary Function Tests. JULIUS H. COMROE, JR., M.D., professor of physiology and pharmacology, ROBERT E. FORSTER, II, M.D., associate professor of physiology, ARTHUR B. DUBOIS, M.D., assistant professor of physiology, WILLIAM A. BRISCOE, M.D., associate in physiology, ELIZABETH CARLSEN, A.B., Isaac Ott fellow in physiology, Graduate School of Medicine, University of Pennsylvania. Chicago: Year Book Publishers. London: Interscience Publishers. 1955. Pp. 219. 40*s*.

THIS book sets out to bridge the gap between a primer and an encyclopædia. It is written for the practising doctor, who can well be excused for not being familiar with the tests elaborated during the past forty years—many of which have been described only in papers written by experts for experts. It is high time that such a book was written and we can be thankful that it has been written (with the help of four young workers who have made their mark in experimental physiology relatively recently) by Dr. J. H. Comroe, an expert of such distinction that he is able to describe his subject in terms which are intelligible. Pulmonary physiologists often seem reluctant to disclose the relatively few and simple facts and hypotheses on which their knowledge is based: instead they take a wicked delight in displaying the technical difficulties which abound in their field of research. Syntheses like this one benefit those who have neither the time, nor perhaps the insight, to sort the immense amount of original work which has gone into the design of these seemingly simple tests. The text is built around a series of diagrams, so beautifully clear that we wish the artist had been named. The plan of the book is simple and direct: an introductory chapter gives a bird's-eye view of the subject and this is elaborated piecemeal in the succeeding chapters. No deep acquaintance with the operations of advanced mathematics is

required to follow the lucid descriptions of methods; adequate lists of normal values are given wherever these are appropriate, and there is a chapter devoted to useful data and equations. Part II describes the results of pulmonary-function tests in a number of cases well chosen for their illustrative value.

This is a thoroughly useful book.

The Health of the Elderly at Home

A Medical, Social, and Dietary Study of Elderly People Living at Home in Sheffield. WILLIAM HOBSON, M.D., professor of social and industrial medicine, University of Sheffield; JOHN PEMBERTON, M.D., M.R.C.P., senior lecturer in social and industrial medicine in the university. London: Butterworth. 1955. Pp. 238. 30*s*.

THIS is a survey, primarily medical but including, as corollaries, inquiries into diet and weekly budget, of 476 old people living at home in Sheffield. The object of this survey, which was aided by the Nuffield Foundation, was to investigate the health and diet of this group, and examine their relation to age, sex, marital and occupational state, and social class "and, if possible, to determine standards of normality in the elderly." Not too much has been attempted: statistics are simple and illuminating, case-histories are few and brief but vivid, and deductions and suggestions—whether for further research or for immediate steps to bring help and comfort to old people at home—are moderate, practical, and justified by the facts. A valuable finding of general interest is the absence of correlation between height of blood-pressure and vertigo, tinnitus, effort angina, clinical arterio-sclerosis, radiological size of heart, albuminuria, activity, and sense of well-being. There is a full bibliography and ample index.

Fluid and Electrolytes in Practice

HARRY STATLAND, M.D., associate in medicine, University of Kansas School of Medicine. Philadelphia: J. B. Lippincott. London: Pitman Medical Publishing Company. 1955. Pp. 206. 35*s*.

THE steady Transatlantic flow of more or less popular books on fluid and electrolytes suggests that the adepts of electrolyte studies in America are anxious to set out their mysteries in terms which are understanded of the people. In this self-imposed task they succeed in varying degree. Dr. Statland's book can be regarded as a qualified success. A good general picture of the various syndromes of electrolyte depletion is presented, and the importance of clinical observation is emphasised, but the underlying chemical alterations are treated rather sketchily, and it comes as something of a surprise to find that the directions for treatment rest somewhat heavily on laboratory results. Also there is too much emphasis on the intravenous route: thus it seems to be assumed that "routine requirements" postoperatively will be met by intravenous fluid, and there is no mention of giving potassium salts by mouth in the treatment of potassium depletion. The book concludes with five short chapters on the special problems of heart-disease, renal disease, diabetic acidosis, pædiatric fluid balance, and finally "burns, cirrhotic ascites, toxæmia of pregnancy." The author consciously allows himself some simplification, "in order to keep the text intelligible to those practising physicians who have long been removed from the basic sciences"; and by doing so he has produced a pleasant volume which will attract rather than repel the curious.

Neurology (2nd ed. Vols. I, II, and III. London: Butterworth. 1954. Pp. 2060. £3 10*s*. per vol., £10 10*s*. per set).—The first, two-volume, edition of Kinnier Wilson's *Neurology*, edited by Ninian Bruce, was a courageous attempt to give to the public at the earliest opportunity the fruits of Wilson's considerable labours. The work, interrupted by the author's death, was inevitably incomplete, and the editing proved at times a source of real frustration to the reader, particularly in the indexing. Despite these faults, the debt of those interested in neurology to the producers of this work is incalculable, and they will greet with especial pleasure this new three-volume edition. The matrix of the work is still Kinnier Wilson's own encyclopædic knowledge—that compound of personal experience and a unique acquaintance with, and recollection of, the apposite literature. More important, the writing is still characterised by the simple majesty of his style, though it is a matter for regret that the personal pronouns of the section on progressive lenticular degeneration have been replaced by the third person. On the other hand, this section has been extended by the addition of details of biochemical importance which were unknown to Kinnier Wilson. Elsewhere, too, the new edition adds to the admirable basic structure new knowledge on ætiology and treatment. In certain sections, as in that on myasthenia gravis, added summaries of the more important neurological advances sometimes sacrifice subtlety to brevity, but this is attributable to the editor's laudable desire to preserve unchanged the general character of the original book. Sir Russell Brain has contributed a section on aphasia, apraxia, and agnosia—a lucid and informative analysis of the chaotic state of our knowledge of these subjects. Dr. Nevin has reviewed the section on neurosyphilis with particular attention to details of treatment with penicillin.

The print is good; a previous tendency to burst into small type on the slightest provocation has been abandoned; and the references are now collected at the end of each volume. The covers, however, seem inadequate both in strength and elegance.

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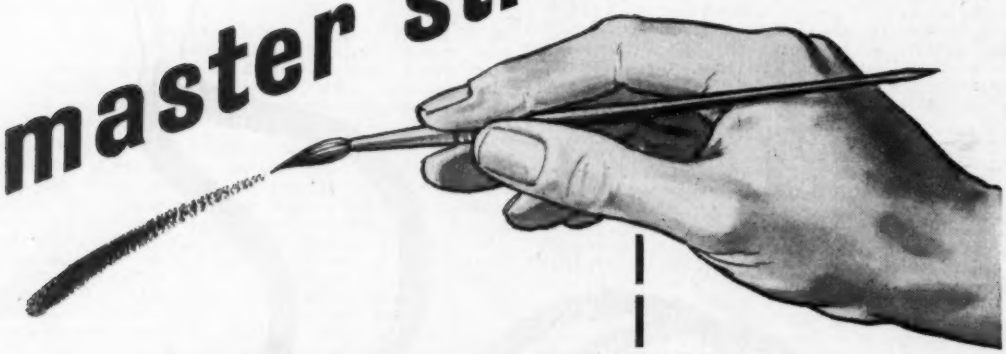

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THE LANCET

LONDON: SATURDAY, JULY 30, 1955

The "Wrong" Hospital

AN elderly man on a motor tour in Devon was smitten with acute retention. He determined to return home rather than be admitted to a strange hospital, and travelled north in easy stages. Wherever he saw a hospital sign he stopped and requested relief; and so progressed, from catheter to catheter, until he reached his home town and the surgeon of his choice. He found that the hospital sign led him at various times to cottage hospitals, city infirmaries, a maternity hospital, and a mental hospital. At all of these his distress was relieved cheerfully and willingly. No praise is too high, in this man's mind, for the National Health Service. Contrast this with the case of a small boy who suffered an injury to his eye and was sent from the eye hospital (because it was an extra-ocular injury), from the accident hospital (because there was no fracture), from the infirmary (because he was a child), and from the children's hospital to the plastic-surgery unit at the regional centre. As hospitals become more and more specialised, the chances of a patient in urgent need of attention being sent to the "wrong" place increase. The lay press has reported many instances of the ill or injured being sent from one receiving-room to another before being accommodated. When such a patient dies soon after admission, this outcome is unlikely to be connected with the transfer from one hospital to another just before death; but distraught relatives are not easily convinced of this, and in any event such transfers are deplorable from the humanitarian viewpoint. The patient with the enlarged prostate was fortunate in that those who saw him—obstetricians, psychiatrists, physicians, surgeons, or general practitioners—were all "doctors"; and we make a plea that the value of this be not forgotten as specialisation continues to grow. Any emergency is liable to send a patient to the nearest hospital, whether or not it is authorised or equipped to deal with his case; and every hospital, we suggest, should have resources at least for applying first-aid, for assessing the severity of the condition, and for arranging transfer to a more suitable centre if the patient is fit to travel further, or accommodating him if he is unfit to travel.

Accident cases are more liable than others to suffer through delay in attention; and GISSANE [1] has called attention to the desirability of extending arrangements for their treatment. A perfect accident service starts at the accident itself. Opinion is still divided about the advisability of applying accident surgery at the scene of the incident; the Ministry of Health has recommended [2] that mobile teams be formed, but some believe this might commonly cause damaging delay in definitive treatment. Effort might be concentrated, in the first instance, on seeing that knowledge of the existing organisation is readily available at the scene of the emergency, that first-aid is correctly given, and that the patient is despatched in the right direction from the very beginning. This calls for correlation of the various services that may be involved—industrial medical units, district nurses, police, fire-brigades, ambulance services, first-aid societies, casualty departments and duty residents in all hospitals, emergency bed bureaux, family doctors, and those medically responsible for public gatherings. These individuals and bodies will be most effective if they are aware of the proper disposal of accident cases before the accidents happen.

There will always be times when hospitals must override the limitations of their special functions. Preparedness will reduce the number of such occasions, but it will never eliminate them.

1. Gissane, W. *Lancet*, 1955, i, 562.
2. H.M.(54)41. See *Lancet*, 1954, i, 1225.

The Action of Insulin

IN the early researches on the cause of diabetes at the turn of the century, a start was made on an ever-widening field of inquiry which now embraces complex biochemistry, enzymology, and isotope studies. It was natural that attention should first be focused on the effect of insulin on the metabolism of glucose, an excess of which in the blood and urine characterises diabetes; but it has since become clear that insulin affects many other metabolic processes either directly or indirectly owing to the altered carbohydrate metabolism. The three main hypotheses of the action of insulin on carbohydrate metabolism can be termed the permeability hypothesis, the hexokinase hypothesis, and the hypothesis of action on oxidative phosphorylation. The permeability hypothesis is in essence the most basic; for if the passage of glucose into the cells is under the control of insulin, then other possible intracellular actions of insulin on glucose would lose much of their relevance, at least in states of acute insulin deficiency.

LEVINE and his group [1] first produced convincing evidence that insulin affects the permeation of sugars into cells. They used galactose because it is metabolically inert in muscle, and they injected this intravenously into animals from which the liver, kidney, and intestines had been removed to prevent the conversion of galactose to glucose. Under these circumstances the "galactose space" represents a measure of the permeation of sugar into muscle. In the controls the galactose space was 45% of the body-weight, representing the extracellular-fluid compartment; but when insulin was administered with the galactose there was an increase of galactose space to about 80%, which represents total body-water. Having studied various sugars by this technique, LEVINE and his colleagues divided them into "insulin responsive" and "insulin non-responsive" groups, and concluded that the entrance of sugar into the tissues is "governed by a transfer system which is especially adapted with respect to chemical structure." In complementary experiments PARK [2] measured the accumulation of "free glucose" in the intracellular space of muscle. He circumvented the usual rapid phosphorylation of sugar on entering the cell by using rat diaphragm chilled to retard the phosphorylation process. In non-insulinised tissue the amount of free glucose approached closely the value to be expected for an entirely extracellular distribution; but in

1. Levine, R., Goldstein, M. S., Huddleston, B., Klein, S. *Amer. J. Physiol.* 1950, 163, 70.
2. Park, C. R. *J. clin. Invest.* 1953, 32, 593.

animals given insulin the quantity of free glucose was four to five times greater than in the insulin-deficient controls. A somewhat similar approach, but using C^{14}-glucose, was made by DRURY and WICK,[3] who separated the effect of insulin on glucose transfer from that on glucose oxidation by competitive inhibition of the latter with β-hydroxybutyric acid. The results showed that insulin still produced increased permeability to the isotopic glucose. If further confirmation is needed that insulin is concerned with glucose permeation, it is provided by Ross,[4 5] who used the barrier formed by the ciliary body of the rabbit's eye to the passage of glucose from the blood to the aqueous humour. He demonstrated by his kinetic data that the transfer of glucose across the cell barrier in the eye is influenced by insulin. It is still unknown whether the insulin effect on permeability is mediated mainly by physical or chemical means.

The hexokinase hypothesis deals with the stage of glucose "activation" once it has penetrated the cell. It is generally agreed that activation of glucose is accomplished by the formation of hexose-6-phosphates by reaction with adenosine triphosphate catalysed by glucose hexokinase. Early reports [6] seem to show that the hexokinase reaction in muscle-extracts of normal and diabetic rabbits is inhibited by pituitary and adrenal-cortical hormones, and that this inhibition is released by the addition of insulin. This work has not been confirmed, however, using preparations with the cell structure destroyed,[7] and the hypothesis clearly cannot explain the extreme insulin sensitivity of hypophysectomised animals. It does explain the greater facility of the diabetic organism to use fructose as compared with glucose in the absence of insulin, since fructose hexokinase acts independently of insulin.[8] It is extremely difficult to obtain information by which to differentiate between the permeability action of insulin and that on gluco-hexokinase; for both appear to have specificity for different sugars, and it is not clear whether this specificity depends on the permeability factor or on a specific action on enzymes within the cell. This uncertainty could be ended only if insulin were shown to act on hexokinase in a homogeneous system.

The third hypothesis of insulin action—that of oxidative phosphorylation—does much to bring together otherwise unrelated experimental facts. The oxidations of the Krebs tricarboxylic-acid cycle are concerned with the formation of high-energy phosphate bonds which are stored as adenosine triphosphate and creatine phosphate. Such energy-rich phosphate bonds are essential for the initial phosphorylation of glucose and possibly also for its transfer across the cell membrane.[7] They are needed, too, for the synthesis of fatty acid and protein. STADIE and his group [9] have obtained clear evidence that insulin increases oxidative phosphorylation in the diaphragm of normal rats. What is more, they have shown that the extra phosphorylation was not associated with increased oxygen uptake or rise in respiratory quotient. They suggest, therefore, that insulin can increase the efficiency of oxidative phosphorylation in the rat diaphragm. More recently STADIE and VESTER [10] have shown that in the cat the mitochondria of the liver seem to be specifically concerned with phosphorylation under the control of insulin.

Our knowledge of the relation of insulin to fat and protein metabolism is still very scanty, since the biochemistry of these materials is less well understood than that of carbohydrate. It has been clear, however, since DRURY's work in 1940 [11] that insulin accelerates fat synthesis, and more quantitative information was provided in 1944 by STETTEN and BOXER.[12] They studied the rate of incorporation of deuterium into the body-fat of normal and alloxan-diabetic rats. In the diabetic animal the rate of utilisation of glucose for fatty-acid synthesis was only 5% of that in the normal, but insulin restored this process towards normal. More recent work [13 14] indicates that this failure to synthesise fat is secondary to deficient glycolysis of glucose. Fructose, the glycolysis of which occurs independently of insulin, restores fat synthesis to normal in untreated diabetic rats. Insulin also favours synthesis of protein—causing, for instance, reversal of negative nitrogen balance and fall of plasma amino-acids.[15 16] As in the case of fat, protein synthesis appears to be influenced by insulin indirectly through its action on glycolysis. KRAHL [17] has measured the incorporation of isotopic glycine into glutathione by normal and diabetic rat-liver slices. The glutathione synthesis in the diabetic was restored towards normal by adding insulin to the medium, especially when glucose also was present.

So far the actions of insulin have been described loosely in terms of the hormone affecting various enzyme systems, but this takes no account of possible modes of molecular interaction. In the case of enzymes, a useful explanation of their action has been based on the concept of a chemical union between the enzyme and its substrate; so it was natural that STADIE should attempt a similar approach to the problem of the action of insulin. He first demonstrated that insulin is specifically bound to cells, in a simple experiment with rat hemi-diaphragms which were shown to synthesise additional glycogen when immersed for a few seconds in a glucose-containing medium.[18] Diaphragms pre-treated with insulin made significantly more glycogen, although control experiments failed to show any insulin free in solution. Later work demonstrated metabolic activity of bound insulin in other tissues, including lactating mammary gland and adipose tissue. Brain tissue failed to bind insulin, and this may be relevant to the evidence that the metabolism of brain is independent of insulin. Various hormones seem to exert a peripheral effect on insulin-binding. This is reduced, for instance, in alloxan diabetes, increased after hypophysectomy, and decreased by prior injection of pituitary and adrenal-cortical hormones. Low bound-insulin values, which in normal diaphragms give no increase in glycogen synthesis, gave almost maximal increases in hypo-

3. Drury, D. R., Wick, A. N. *J. biol. Chem.* 1952, **196**, 129.
4. Ross, E. J. *J. Physiol.* 1951, **112**, 229.
5. Ross, E. J. *Ibid*, 1952, **116**, 414.
6. Cori, C. F. *Harvey Lect.* 1949, **41**, 253.
7. Stadie, W. C. *Amer. J. med. Sci.* 1955, **229**, 233.
8. Renold, A. E., Hastings, A. B., Nesbett, F. B. *J. biol. Chem.* 1954, **209**, 687.
9. Haugaard, N., Marsh, J. B., Stadie, W. C. *Ibid*, 1951, **189**, 59.
10. Stadie, W. C., Vester, J. W. Cited by W. C. Stadie (footnote 7).
11. Drury, D. R. *Amer. J. Physiol.* 1940, **131**, 536.
12. Stetten, D. jun., Boxer, G. E. *J. biol. Chem.* 1944, **156**, 271.
13. Baker, N., Chaikoff, I. L., Schusdek, A. *Ibid*, 1952, **194**, 435.
14. Chernick, S. S., Chaikoff, I. L. *Ibid*, 1951, **188**, 389.
15. Mirsky, I. A. *Amer. J. Physiol.* 1938, **124**, 569.
16. Lotspeich, W. D. *J. biol. Chem.* 1949, **179**, 175.
17. Krahl, M. E. *Ibid*, 1953, **200**, 99.
18. Stadie, W. C., Haugaard, N., Hills, A. G., Marsh, J. B. *Amer. J. med. Sci.* 1949, **218**, 275.

physectomised rats [19]—the first clear-cut demonstration that hypophysectomy can increase the insulin reactivity of the peripheral tissues.

At present many of the data on the mode of action of insulin have not been integrated into any unified scheme; but with the growth of information on the more basic biochemical processes, particularly in fat and protein metabolism, some simplification of ideas should be possible.

Bread

Two years ago we reviewed [20] the history of the extraction-rate of flour, from the time immediately after the first world war when the need to find feeding-stuffs for livestock caused reversion to a whiter loaf. On each occasion when the extraction-rate has been lowered we have deplored the consumption of whiter bread, and we go on deploring it even now that the flour is enriched with nutrients—i.e., when additions are made to improve it or to compensate for what has been removed in milling. In his Sanderson-Wells lecture for 1953 Sir CHARLES DODDS [21] went far to demolish the argument that all food must continue to be consumed as nearly as possible in the form in which it is provided by Nature: he showed that survival of the present large populations of the world depends on processing of food which permits its storage and distribution, and he evidently regarded the wheat grain (itself already modified by man) as a raw material from which biochemists and caterers are fully entitled to produce something more agreeable than a palæolithic scone. In his Sanderson-Wells lecture for 1955, which we publish this week, Prof. R. A. MCCANCE traces the preference for wholemeal bread from PLATO to the Food Education Society: it is, he says, part of a nostalgic, almost mystical, belief of town-dwellers in the lost virtues of their forefathers' rural life, and it has nothing to do with fact and realities, ancient or modern. Yet in face of these persuasive lectures we maintain unrepentantly that, when it is a question of altering what has been a staple food for a very long time, the onus of proving advantage lies on those who wish to make the alteration, not on those who oppose it. Neither for the use of chemical improvers of flour nor for a low extraction-rate do we regard this advantage as proved.

The Conference on the Post-War Loaf,[22] held in 1945, was divided in its views about the extraction-rate. The members of the official side, who included Lord HORDER, disapproved of enrichment and held "that the retention of the natural constituents of the wheat grain is so incomparably preferable to reinforcement that they are not prepared to contemplate the adoption of" enrichment; but the representatives of the industries would not recommend that enrichment should be prohibited. Both sides were agreed that flour should contain not less than stated amounts of the three "token" nutrients—thiamine, nicotinic acid, and iron. Two years ago, when cereals were decontrolled, the Flour Order 1953 [23] required that any flour with an extraction-rate of less than 80% should have these three nutrients restored to the minimum amounts specified by the Conference on the Post-War Loaf. Continued consumption of flour with an extraction-rate of 80% or more was encouraged by the retention of a subsidy by which the 1¾ lb. loaf of National bread sold at 7½*d.* whereas unsubsidised breads made from whiter flours sold at 10*d.*–1*s.*; and this difference in price has been largely responsible for the relative unpopularity of the white loaf recommended by the National Association of Master Bakers.[24] But clearly such a subsidy could not be long maintained if the white loaf were really shown to be the better. In their authoritative book, written as nutritional advisers to the British milling industry, Lord HORDER, Sir CHARLES DODDS, and Mr. T. MORAN, D.SC.,[25] emphasised the importance, in deciding this issue, of MCCANCE and WIDDOWSON'S work on undernourished German school-children, of which short abstracts only had then been published; and the account of this work given at the front of our present issue may suggest that it does in fact say the last word on the subject. But does it?

This experiment of MCCANCE and WIDDOWSON'S was started as a result of the difference of view of the members of the Conference on the Post-War Loaf, and it has now been reported in full.[7] The trials were made in 1947–48 in two orphanages in Germany with children whose previous diet had been insufficient for their needs and who were consequently below the weight and height usually considered normal for their age. The children were divided into groups and given unlimited amounts of bread made from five different flours—namely, 100%-extraction; 85%-extraction; 70%-extraction; 70%-extraction enriched with the three token nutrients and riboflavine to the amounts present in 100%-extraction flour; and 70%-extraction enriched with these nutrients to the amounts present in 85%-extraction flour. The rest of the diet was mainly vegetables, and the amount of animal protein was very low. The children grew even faster than British or American children of the same age, and, during the twelve months of the trial, growth was equally good on each of the experimental flours. But the investigators rightly said "that the greatest caution must be exercised in coming to any conclusion at all," and there are in fact certain points, not particularly emphasised in their report, which must be taken into account in assessing any nutritional differences between the breads. First, the children under study were initially short of calories and were therefore underweight; but they were probably not deficient in vitamins, which were being fairly liberally distributed at that time to German children through the auspices of the Swedish Red Cross and other organisations. Secondly, an analysis of the calories and nutrients they consumed during the experimental period shows that these were adequate, with the possible exception of riboflavine. There seems indeed to be no reason whatever why the children should not have grown optimally even upon the 70%-extraction flour without fortification. But an outstanding and important point is that this 70%-extraction flour had a much higher content of nutrients than is usual. For

19. Stadie, W. C., Haugaard, N., Vaughan, M. *J. biol. Chem.* 1953, **200**, 745.
20. *Lancet*, 1953, i, 1235.
21. Dodds, E. C. *Ibid*, p. 1211.
22. Cmd. 6701, H.M. Stationery Office; see *Lancet*, 1945, ii, 789.
23. S.I. 1953/1282. H.M. Stationery Office.
24. *Times*, Sept. 23, 1953.
25. Bread: the chemistry and nutrition of flour and bread with an introduction to their history and technology. Constable, London. 1954. Pp. 186. 18s.
26. Widdowson, E. M., McCance, R. A. *Spec. Rep. Ser. med. Res. Coun., Lond.* 1954, no. 287; see *Lancet*, 1954, ii, 1006.

instance, it contained about 0·15 mg. of thiamine per 100 g. of flour, whereas according to Lord HORDER and his colleagues [25] 73%-extraction flour as used in this country averages 0·09 mg. per 100 g. Similarly, the amount of nicotinic acid in the 70%-extraction flour used in Germany was about double that occurring in flour of this extraction typically used in this country. In fact, the white flour of WIDDOWSON and MCCANCE approximated, as regards these vitamins, to the National flour of this country. That these high vitamin values for the white flour used in Germany were not caused by differences in analytical methods is indicated by a paper published by MCCANCE and his colleagues on the chemical composition of wheat just before the German experiments began [27]; the figures given in this paper for the composition of flours of 70% extraction are in general much lower than those for the flours used in Germany. Thus in this important trial, one purpose of which was to test the nutritional differences between flours of different extraction fortified and unfortified, the whiter flour used does not appear to have been typical of the 70%-extraction flour used in this country.

The millers and bakers are said to be anxious that the subsidy on National flour, which costs about £30 million per year, should be removed and that the public should be offered at one and the same price either National flour or 70%-extraction flour fortified with the three token nutrients. To advise the Government whether this should be done, a panel has been appointed [28] to determine, in the light of the scientific and medical evidence now available, the difference in composition and nutritive value between National flour and flours of low extraction-rate with or without the three token nutrients, and also to advise whether any such differences are significant from the point of view of the health of the population. The question to be decided is whether it is better to keep to high-extraction (i.e., National) flour or to use flour from which a number of nutrients have been removed and to which three have been restored.

27. McCance, R. A., Widdowson, E. M., Moran, T., Pringle, W. J. S., Macrae, T. F. *Biochem. J.* 1945, **39**, 213.

28. *Lancet*, 1955, i, 1021.

Annotations

TREATMENT OF TETANUS

IN this country tetanus kills sixty to eighty people a year. Most of those attacked are active and healthy, and about half of them are children. Severe tetanus, though its manifestations are terrible, leaves no sequelæ: those who recover do so completely. Much thought has been given to increasing the chances of survival. Despite the difference in their pathology, severe tetanus and bulbospinal poliomyelitis have much in common. In both diseases the primary cause of death is respiratory insufficiency. This insufficiency has two components. One is impairment of the bellows action of the chest; the other is the pulmonary infection which arises, through disorganisation of the pharynx and larynx, from invasion of the lungs. A striking decrease in the death-rate from bulbospinal poliomyelitis has been achieved, since 1952, by the application of the principles worked out in Denmark by Lassen [1] and by Ibsen.[2] It seemed reasonable to hope that the analogous manifestations of tetanus might yield to the same methods, particularly if the analogy could be made closer by converting the spasticity of tetanus into the flaccidity of poliomyelitis, so that the bellows action of the chest could be more easily restored by artificial respiration. The muscle relaxants have been used commonly in tetanus, but it is only in the past two years that clinicians have become aware of the promise offered by bringing tetanus close to poliomyelitis, and then treating it on the lines which have been so successful in that disease.[3] Several recoveries have resulted from applying this plan, but it has not proved as spectacularly successful as might have been expected theoretically. This is probably because of the difficulty of carrying out the treatment, which is exacting and calls for nice judgment.

In severe tetanus the main objectives are to keep the respiratory tract free from invasion, to reduce muscle spasm, and to maintain nutrition.[4] Tracheotomy is the best means of protecting the respiratory tract [5 6]; while muscle spasm has been countered by means of drugs which reduce hypertonia either by central depression [7] or by peripheral neuromuscular block. The disadvantage of the central depressants is that they further impair the activity of the brain stem, already attacked by tetanus toxin. The disadvantage of the relaxants is that their use often demands long-continued artificial respiration.

That the central depressants can be used with success is shown by Forbes and Auld,[8] who report fifteen consecutive cases of tetanus without a death; careful protection of the lungs, and the use of narcotics in small doses, were the main features of their treatment. Dr. Bodman and his colleagues report elsewhere in this issue a case with a short time of onset in which life was maintained for twelve days. The lungs were protected by an airway, posture, and suction; and the hypertonia was treated mainly by chlorpromazine, pethidine, and nitrous oxide. This did not suffice to prevent convulsions, one of which resulted in fatal anoxia; but the nitrous oxide and chlorpromazine evidently played a useful part. It may be that their action, though central, is at a different level from that of the narcotics, so that it helps to reduce hypertonia without at the same time depressing the vital centres. Those impressed by the disadvantage of the relaxants—namely, that artificial respiration is commonly necessary—may wish to try Bodman's method of reducing hypertonia.

ABORTION LEGISLATION IN U.S.S.R.

THE law of England changes slowly. It reacts only after a cautious interval to shifting social conditions, the changing climate of public opinion, or developments in scientific knowledge. Medical practice is more susceptible to these influences than legal practice, and while the lawyer hesitates the doctor is sometimes in a difficult position. Today several points at which a legal reaction may be in due course expected touch on medicine. One of these is the law of abortion. Discussions on its possible amendment have been going on for a long time, and the last short-lived amending Bill was introduced in Parliament in 1953. The experience of other countries is therefore relevant, and a recent summary of Soviet legislation [9] will be of interest to lawyers and doctors alike.

The preamble to the first Russian Act on abortion, which was passed in 1920, pointed out that prohibition only drove the evil underground. By propaganda and legislation for the protection of mothers and children the government hoped to eradicate it gradually. In the meantime abortion was legalised with certain safeguards:

1. Lassen, H. C. A. *Lancet* 1953, i, 37.
2. Ibsen, B. *Proc. R. Soc. Med.* 1954, **47**, 72.
3. Woolmer, R. *Brit. med. J.* 1954, ii, 702. Lassen, H. C. A. Bjørneboe, M., Ibsen, B., Neukirch, F. *Lancet*, 1954, ii, 1040.
4. Wilson, G., Care, A. D. *Lancet*, 1955, i, 1303.
5. Herzon, E., Killiam, E., Pearlman, S. J. *Arch. Otolaryng., Chicago*, 1951, **54**, 143.
6. Creech, O., Woodhall, J. P., Ochsner, A. *Surgery*, 1950, **27**, 62.
7. Docherty, D. F. *Lancet*, 1955, i, 437.
8. Forbes, G. B., Auld, M. *Amer. J. Med.* 1955, **18**, 947.
9. *Bulletin de l'Association d'Études et Information Politique Internationale.* 1954, **16**, 22.

the operation must be performed, without fee, in a State hospital, by a doctor. The penal code of 1922 laid down that an unqualified person who performed the operation, or a doctor who performed it for a fee, was liable to a year's imprisonment or forced labour. Where the operation was performed without the consent of the woman, or where the woman died, the sentence could be increased to five years' imprisonment.

This legislation remained in force till 1936, when a new Act was passed, making abortion illegal except when the life of the mother was endangered or where the parents had a hereditary disease. Penalties were imposed of one to two years' imprisonment for a doctor who performed the operation illegally, and a minimum sentence of three years for unqualified persons or where the operation had been carried out in unhygienic surroundings. To force a woman to undergo an abortion carried a penalty of two years' imprisonment. A pregnant woman who in defiance of this Act arranged for an abortion was to be punished by public opinion, and on a further offence by a fine of up to 300 roubles.

By an order of the Supreme Soviet, dated Aug. 5, 1954, the penalties imposed on the woman were revoked. The penalties for those performing the operation remain in force.

ENEMAS

THE enema or clyster is a very old remedy; references to its use as early as 600 B.C. have been found in Babylonian and Assyrian tablets. The Egyptians invented many curious mixtures for the purpose. The Greeks avoided such extravagances and used only boiled water or saline, occasionally adding milk, honey, or oil. But Hellenic good sense did not last, and in the Middle Ages complicated enema solutions were reintroduced. The peak of absurdity was reached in 17th-century Europe when, according to Liebermann,[1] it was the fashion in smart Parisian circles to have three or four delicately tinted and scented enemas daily; King Louis XIV himself is said to have received over two thousand in his lifetime. This period has been called the Century of Clysters. 18th-century rationalism led to a decline in the enema's popularity; but the custom of ritual cleansing of the lower bowel persisted until comparatively recent times. Today it seems to be agreed that the purpose of an enema is purely evacuatory; the giving of enemas containing astringent, sedative, or so-called stimulating drugs is virtually useless. As an evacuant the enema is of great value in the post-operative period; in medical diseases it is rarely required. The regular or repeated administration of enemas, especially to children, may be psychologically harmful.

To evacuate the rectum, the enema need consist only of one pint of plain warm water. The addition of soap is unnecessary and indeed may irritate the mucosa; but it is a custom that dies hard. According to Jackson,[2] it arose because many years ago the English translator of a French treatise on enemas mistakenly assumed that the word *lavage* implied the use of soap as well as water. Anyhow, nurses are still taught in our hospitals to give an enema saponis. They are also expected to be familiar with many other medieval confections containing, for example, ox-bile, asafœtida, and black treacle. A current nursing manual contains thirteen such recipes; fortunately they seem to be rarely prescribed. For administration a funnel and a soft rubber catheter should be used. Higginson's syringe, with its hard bone nozzle, may injure the rectum. A new plastic disposable dispensing unit has been introduced,[3] which seems to be essentially the "clyster-purse" of Avicenna (A.D. 980–1037).

1. Liebermann, W. *Rev. Gastroent.* 1946, **13**, 215.
2. Jackson, W. P. U. *Lancet*, 1950, **ii**, 324.
3. Page, S. A., Riley, C. R., Haag, H. B. *J. Amer. med. Ass.* 1955, **157**, 1208.

GROWTH HORMONE

GROWTH hormone or, as it is often called, somatotrophic hormone has been prepared from pituitary glands in a form which is biologically free from contamination with the other pituitary trophic hormones. Its physico-chemical and physiological properties have been extensively studied, and some of this work has been reviewed by Weil.[1]

Growth hormone, in a broad sense, is a metabolic hormone, and is characterised by ability to act without the mediation of any target gland. It acts on all cell systems—epithelial, mesothelial, and endothelial—and it influences the metabolism of protein, carbohydrate, and fat. Growth hormone causes an increase in the rate of protein formation which is evident in growth of cells. It probably affects the rate of both protein anabolism and amino-acid katabolism; the two together are measured by the amount of nitrogen retained in the body. Its action is influenced greatly by the nutritional state, being enhanced in the well-fed and diminished or abolished in the starved animal. The protein deposited in the tissues is apparently in a labile, functionally ineffective form which is transformed, under the influence of the thyroid hormone, into specific, physiologically active tissue components. The action of growth hormone on protein metabolism depends upon the presence of circulating insulin. It fails to store protein in the depancreatised animal without insulin, and its effectiveness increases with increase in the dosage of insulin administered. Lastly it is influenced by the presence of certain circulating steroids, such as testosterone, which are known to cause an increase of protein in the body. Its action therefore contrasts with that of corticotrophin and the other adrenocortical oxysteroids which diminish the amount of total body protein.

Growth hormone has long been known to influence carbohydrate metabolism. The administration of this hormone to a fasting rat causes initially a fall in the level of the blood-glucose. The physiological background of this effect is not understood, but continued administration leads to a progressive rise in the level of glucose and a corresponding increase in the secretion of insulin—a change associated with the development of remarkable resistance to insulin. In some animals the persistent hyperglycæmia causes at first temporary exhaustion of, and later permanent change in the pancreatic islet tissue, and diabetes mellitus supervenes. In addition to increasing the secretion of insulin, growth hormone inhibits the peripheral utilisation of carbohydrate and increases the storage of glycogen in the muscles; but there is evidence that the maintenance of glycogen stores by a related phenomenon, glyconeogenesis, is a function of corticotrophin.

The action of growth hormone on fat metabolism is interesting. The carcass-fat of treated animals is reduced. Fat katabolism occurs at the expense of depot-fat, for the level of lipids in the serum is raised and triglycerides accumulate in the cells of the liver. This enhanced utilisation of fat is further demonstrated by depression of the respiratory quotient and formation of ketone bodies. Corticotrophin and the adrenocortical oxysteroids likewise stimulate the formation of ketone bodies and promote the deposition of lipids in the liver, but they do not appear to accelerate the mobilisation of depot-fat and may even tend to augment the storage of carcass-fat.

Whether growth hormone acts independently on protein, carbohydrate, and fat, or whether it acts on one or other primarily and the rest secondarily, is undecided. Perhaps the most widely held view is that it acts primarily by increasing the utilisation of fat, thus sparing protein.

1. Weil, R. *Arch. intern. Med.* 1955, **95**, 739.

SLIPPED FEMORAL EPIPHYSIS

SLIPPING of the upper femoral epiphysis is primarily a disorder of puberty: it is rare before the age of ten years and does not arise in late adolescence after the epiphysis has fused. It is four times as common in boys as in girls and is usually unrelated to injury. Two varieties of slipping are recognised: (1) the "acute," which is uncommon and is associated with complete displacement of the head; and (2) the "chronic," in which the onset is insidious and diagnosis may be difficult.

Most children with this condition are overweight, and some have a typical adrenogenital syndrome. Perhaps an endocrine disturbance produces changes in the epiphyseal cartilage, a possibility supported by the experiments of Harris,[1] who found that growth hormone decreased, and sex hormones increased, the resistance of the epiphyseal plate of the rat to shearing. Löfgren [2] has shown that the pituitary fossa is small in the child with slipping of the upper femoral epiphysis. While endocrine factors may play an important part, there is no doubt that the increasing obliquity of the epiphyseal plate during growth is a predisposing factor, and that this must dictate the downward and backward displacement of the femoral head. Klein et al.[3] have emphasised that such displacement is commonly bilateral; as many as 40% of their patients ultimately showed changes in both hips. In the diagnosis of minor degrees of slipping lateral radiography is essential; and, when the disorder is bilateral, comparison with standard radiographs may be necessary.

Attempts to reduce the displacement by traction or manipulation, although reported by Heyman [4] to give good results, have fallen out of favour. Cleveland et al.[5] have shown that no permanent reduction can be maintained by this method, and the incidence of avascular necrosis of the femoral head is considerable. Most surgeons prefer to apply traction only when the slipping is acute, and to follow this by surgical fusion of the head and neck. When the slipping is slight, reduction is probably contra-indicated; and insertion of a Smith-Petersen nail through the neck into the head of the femur produces reasonable fixation, and ultimately epiphyseal fusion. The theoretical advantages of bone-grafting across the epiphyseal plate,[6] which produces fusion more rapidly and has the merit of opening the epiphysis to metaphyseal blood-vessels, must be weighed against the increased risks of open operation.

In the presence of considerable displacement of the femoral head, nailing without reduction is neither desirable nor, in most cases, feasible. The deformity may be corrected by wedge osteotomy of the neck of the femur, and the position of the fragments can then be maintained by a nail or wires. Wagner and Donovan [7] have had considerable success with this procedure, and Compere [8] has emphasised the importance of over-correction in changing the line of shear in the femoral neck. Avascular necrosis of the head of the femur is apparently uncommon after this operation.

Harris [9] has drawn attention to the importance of early diagnosis and has described a characteristic symptom-complex—a limp of spontaneous onset, and pain referred to the knee, in an obese adolescent. Since the deformity may progress despite relief from weight-bearing, and since the hip appears to tolerate, at least for many years, minor changes in its anatomical configuration, surgical fixation of the head at this early stage appears justifiable. In an adolescent of good stature, approaching the end of the growth period, sex hormone may result in epiphyseal fusion and also maintain limb equality. No general agreement exists about the merits of the more extensive reconstructive operations. Howarth [10] has emphasised that this is a disease of limited duration which is usually followed, even without treatment, by a long period of symptomless activity. The evaluation of treatment is very difficult, since despite a good anatomical result arthritis may develop in later life. It may be better for the patient to await the onset of arthritis before submitting to a radical operation.

1. Harris, W. R. *J. Bone Jt Surg.* 1950, **32B**, 5.
2. Löfgren, L. *Acta chir. scand.* 1953, **106**, 153.
3. Klein, A., Joplin, R. J., Reidy, J. A., Hanelin, J. *J. Bone Jt Surg* 1953, **35A**, 81.
4. Heyman, C. H. *Surg. Gynec. Obstet.* 1949, **89**, 559.
5. Cleveland, M., Bosworth, D. M., Daly, J. N., Hess, W. E. *J. Bone Jt. Surg.* 1951, **33A**, 955.
6. Heyman, C. H., Herndon, C. H. *Ibid*, 1954, **36A**, 539.
7. Wagner, L. C., Donovan, M. M. *Amer. J. Surg.* 1949, **78**, 281.
8. Compere, C. L. *J. Bone Jt Surg.* 1950, **32A**, 351.
9. Harris, W. R. *Canad. med. Ass. J.* 1955, **72**, 835.

TEA

IN the 1930s popular-song writers proclaimed, with little risk of contradiction, that "everything stops for tea," and there is no reason to believe that events since then have disturbed this custom. In the U.S.A., where once the "colonists" dumped tea into Boston harbour and even today they accuse the British of enslavement to the habit, consumption in 1954 had risen to the equivalent of 138 cups for each member of the population. This gain in popularity may have been partly responsible for the decision to arrange the symposium on this subject which was held in New York last May.[11]

As Prof. J. C. Krantz pointed out, "only those beverages which affect the central nervous system have survived the acid test of time." Tea is supposed to derive at least some of its attributes from its content of caffeine. Throughout the world, various drinks containing caffeine have become established independently—tea in China, coffee in Arabia, kola in West Africa, and maté in Paraguay. Any regular tea-drinker will nevertheless aver that taking the appropriate amount of caffeine alone, or even with tannin, cannot be compared with savouring the natural infusion. In the symposium Krantz remarked that the drinking of infused tea leads to slight psychic stimulation and mild diuresis on account of the caffeine, and an astringency to the alimentary tract from the tannin. Dr. H. J. L. Marriott maintained that, despite the variety of its constituents, "tea is a relatively harmless beverage"; while Dr. R. L. Jenkins emphasised that its cheering effect may be mainly psychological. The experimental studies of Wirts et al.[12] indicate that in the alimentary tract tea does little but increase the rate of gastric emptying (a faculty that it may share with other beverages), while Stanley and Schlosberg [13] demonstrated little change in the performance of certain psycho-physiological tests after taking tea that could not be ascribed simply to the custom of drinking it.

In his introduction to the symposium Dr. S. O. Waife suggested that, so far as tea is concerned, "the whole may be greater than the sum of its parts"; and certainly its effects on body and mind cannot be calculated merely according to its constituents; this would not explain, for instance, the seeming paradox whereby old people may ultimately get off to sleep after a restless night watch by taking a cup of tea—despite its caffeine content. Medically, there seems to be hardly a single contra-indication to tea-drinking in moderation. What matters is that it should be carefully infused to please the palate, and taken in appropriate company to profit the mind.

Mr. CHARLES READ has been elected president of the Royal College of Obstetricians and Gynæcologists.

10. Howarth, M. B. *J. Bone Jt Surg.* 1949, **31A**, 734.
11. Tea: A Symposium. Washington: Biological Sciences Foundation. 1955.
12. Wirts, C. W., Rehfuss, M. E., Snape, W. J., Swenson, P. C. *J. Amer. med. Ass.* 1954, **155**, 725.
13. Stanley, W. C., Schlosberg, H. *J. Psychol.* 1953, **36**, 435.

Special Articles

A CONSULTATIVE HEALTH CENTRE FOR OLDER PEOPLE

The Rutherglen Experiment

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THREE years ago the public-health department of Rutherglen started a welfare service for old people. Our aim was to maintain them in a sound state of physical, mental, and social well-being, and we have tried to carry it out (1) by providing clinical facilities for medical assessment at the premises of the local authority; (2) by coöperating with other statutory and voluntary services for old people; (3) by extending the health visitor's work to the aged; and (4) by setting up a chiropody service.

The functions of the centre are: to promote health and prevent disease; to compile a register of old people living within the district; to search for early and unsuspected disease by the examination of older people with no complaints and those with minor ailments; to integrate treatment with social environment through aftercare; to run a citizens' advice bureau for old people; to research into the ageing process.

Before theory was put into practice we held a meeting with some of the local general practitioners to discuss how the centre should be run. Out of this discussion the present system arose and it has remained unchanged from the start. All new patients are introduced through the general practitioners, who are free to select patients they think likely to benefit from the centre's help.

HOW THE CENTRE WORKS

Rutherglen is a good site for an experiment of this kind, for it is a densely populated area (25,000 people in 1046 acres) with a central, well-equipped local-authority clinic, in which the old people's centre is housed. Besides the usual services provided by a local health authority, diagnostic chest and gynæcological out-patient clinics of the Western Regional Hospital Board are held here.

The medical officer of health sees new cases in the earlier part of each week and interviews any old patient who returns for guidance. He carries out general clinical and medicosocial assessments. As he is also the chest physician for the burgh, he can arrange directly for radiographs of the chest and, where necessary, other parts of the body. The interview and examination is informal, for if an old person is given a cup of tea, important facts can often be elicited which otherwise remain undiscovered. The consultant physician holds a clinic each Friday morning and examines the new cases seen in the earlier part of the week by the M.O.H. and those returning for continued supervision. With the consultant physician comes one of his house-officers who carries out simple laboratory procedures at the centre—for example, hæmoglobin estimations, red and white blood-cell counts, blood-films, and test-meals. More complex investigations are dealt with by the regional laboratory service. All new patients are introduced to the centre through their own general practitioners, and the consultant physician dictates the letters which are sent to the doctors. These letters give the opinions of the consultant physician and the M.O.H. and cover the clinical and medicosocial needs of the patients.

Health visitors attend the clinic sessions and thus gain an insight into the problems of old age and the needs of the patients whom they may later visit. Representatives of the Rutherglen Old People's Welfare Committee also attend the centre each Friday morning. They try to encourage patients who have not already done so to join this organisation. These voluntary workers make domiciliary visits as occasion demands, and also conduct occupational therapy at the clinic.

A physiotherapist is employed at the centre by the Western Regional Hospital Board, while a chiropodist is paid by the local authority for part-time work. A charge of 1*s.* 6*d.* is made for chiropody, but this may be waived, wholly or in part, at the discretion of the M.O.H. If a patient wishes to pay more than the standard charge, he may do so.

If the consultant physician thinks that more investigation is necessary, a further examination at the centre or admission to a hospital for short-stay assessment is arranged.

PHYSICAL HEALTH OF THE OLD PEOPLE

From August, 1952, to November, 1954, some 500 ambulant old people have attended the centre, 243 men and 257 women; 288 of them were seventy years of age and over. 148 had no symptoms, 107 of whom were aged from seventy upwards; 352 mentioned some degree of physical disability. Pain in various sites of the body was the commonest symptom, followed by weakness, breathlessness on exertion, and giddiness. Symptoms of this kind were the main complaints made by 315 (89%) of the 352 cases.

The general nutrition of the old people, their height, and weight, were noted. Their percentage overweight to ideal weight was reckoned according to Anderson's nomogram (Greene 1951). 20 of the women, but none of the men, were 50% overweight, while in the 20–49% overweight group, there were 67 women and only 26 men. Among the 148 old people with no complaints only 7 women were 30% or more overweight, none being over 50% overweight; 103 were 1–9% overweight.

Blood-pressure readings were taken by one observer at the end of the clinical examination after the patient had been lying quietly for thirty minutes and often the reading was verified by a second observer.

Blood-pressure readings in elderly people are under review at present (Hamilton et al. 1954). In 1922 Symonds stated that for people of sixty and over the average normal blood-pressure was 135·2/86·9, but in 1952 Masters et al. suggested for the age-group sixty to sixty-four years a range for men of 115–170/70–100 and for women of 115–175/70–100. In our series, however, no fewer than 126 men and 187 women had a systolic pressure of over 170 mm. of mercury, while 28 men and 53 women had a diastolic pressure of over 109 mm. Among the old people with no complaints, 42 men and 43 women had a systolic pressure of over 170 mm., and 10 men and 7 women a diastolic pressure of over 109 mm.

The results of the hæmoglobin estimations were better than expected. 396 out of the 500 cases showed a level of 80% or over, and in only 9 patients was the hæmoglobin content less than 60%. The hæmoglobin percentage was estimated by one observer using a Sahli hæmoglobinometer, calibrated by the same observer against specimens estimated in a standardised photo-electric instrument using the oxyhæmoglobin method. (70% = 11 g. per 100 c.cm.; 80% = 12·7 g.)

The principal measures we have taken to improve the health and promote the welfare of these old people are as follows:

(1) The prescription of drugs—such as iron, tolazoline hydrochloride, theophylline ethylene diamine, phenobarbitone and, for some, and after sensitivity tests, an antibiotic. Deafness in 11 patients was due to wax in the ears and this was successfully dealt with by syringing.

CAUSES OF UNHAPPINESS AMONG 126 OLD PEOPLE *

—	Women	Men	Total
Extreme loneliness	20	7	27
Restriction of activities due to physical ill health	21 (2)	5	26 (2)
Alone and unable to provide reasonable care and attention for self	11 (7)	5 (2)	16 (9)
Disagreement within the family circle	11	5	16
Grief over death of near relative	5 (2)	6	11 (2)
Neglect by children	4 (3)	4 (4)	8 (7)
Dissatisfaction with place of residence	1	5 (1)	6 (1)
Nursing invalid relative	4 (1)	1	5 (1)
Introspection	3	1	4
Husband drinks to excess	3	0	3
Miscellaneous	0	4 (1)	4 (1)
	83 (15)	43 (8)	126 (23)

* Figures in parentheses show those who were also lonely.

(2) Patients with obesity or malnutrition were advised on food intake and in the regulation of their daily lives.

(3) 8 patients were sent to the surgical outpatient department of the consultant physician's parent hospital with the permission of the general practitioners. 13 women received attention at the gynæcological unit in the public-health department. 16 patients with diseases of the eye, skin, or ear, nose, and throat were referred for consultant opinion through their own general practitioners.

(4) 18 of our 500 cases were admitted to the hospital attended by the consultant physician for further investigation, and, on occasion, for a period of rest in bed.

(5) Physiotherapy was freely used with the emphasis on individual attention. Small-group instruction for suitable exercises—such as breathing exercises—was commonly advised with success.

(6) The centre's chiropodist—or, the patient's own chiropodist—was used for many and varied foot defects.

(7) Surgical appliances were prescribed as needed. Many of the old men with herniæ wore trusses which had long passed their usefulness and new trusses were recommended.

(8) The eradication of lice was necessary for two old people.

(9) 9 women and 5 men were admitted to the local authority's residential home for the aged. Others were rehoused at ground level.

THEIR MENTAL HEALTH

Of the 500 old people 126 (25%) were unhappy of whom 61 (48%) lived alone. Patients were regarded as happy when they were mentally at ease, and showed no undue evidence of worry or anxiety about their health or home circumstances. The principal causes of unhappiness in these 126 patients are shown in the accompanying table.

We tried to improve morale and promote mental health by the following procedures:

(1) While the M.O.H. made his medicosocial assessment he tried, wherever possible, by explanation, reassurance, or guidance, to deal with problems as they came up. The later medical examinations, by the M.O.H. and the consultant physician, were used, along with the coöperation of the general practitioners, to reinforce the advice already given.

(2) Where necessary patients were visited in their homes by the M.O.H. and the health visitors.

(3) Patients, with their consent, were introduced to the activities of the Old People's Welfare Committee.

(4) Free holidays were arranged for some patients.

(5) Financial aid was given in special cases from private sources.

(6) Some patients were admitted to the residential home of the local authority.

(7) The patients, generally, were advised to extend their range of interests, and ways and means of doing so were suggested.

DISCUSSION

At the outset of this scheme there was no guarantee that the old people would use the centre, but from the start we have had a steady flow of new patients. There is as yet no sign of slackening, and according to the 1951 census the number of people over the age of sixty years in the area was 3802. All new cases must come through their general practitioners, and experience has shown this to be a wise procedure. The G.P.s are a link between the old people in the community and the centre. Their coöperation with the M.O.H. and the consultant physician has been excellent. They consistently chose their cases with discernment bearing in mind the aims of the service. Non-ambulant old people were outwith the immediate scope of the centre, because it was believed that they were covered by the existing services. Furthermore, it was felt that the first requirement was to start an integrated preventive service to keep old people ambulant, happy, and, if possible, out of hospital.

The physiotherapist, apart from his professional work, by his personality encouraged his patients to overcome their disabilities. He enhanced their morale and was a valuable ancillary to the doctors. The need to concentrate on improving the morale of the patients applied with equal force to the health visitors, and to the chiropodist. Indeed the chiropodist, during the half-hour which he spends on a person's feet, has a unique opportunity to hold his subject in conversation. Our chiropodist took part in the follow-up of the patients and reported directly to the M.O.H. any problems which came to his notice.

Many of the patients had few outside interests and some were virtually social isolates. Unhappiness was common among those who lived alone, and there were patients who needed the comfort of considerate friends, but had none. The Old People's Welfare Committee provided the ideal answer to many such problems as they interviewed the old people who passed through the centre. The old people were encouraged to share in the activities of the committee, and the committee discovered in the centre a valuable and continued source of new people whom they could help. This liaison between statutory and voluntary effort was of advantage to all. The successful conduct by voluntary workers, admittedly in a small way, of an occupational-therapy class for old people in the premises of the public-health department merits serious attention. At a recent display and sale of work £90 was realised on articles made by the old people.

Some believe that a consultative health centre for older people is comparable to a child-welfare clinic. While it is true that both are services to promote health, there the analogy ends. Children are usually cared for by loving and devoted parents. The aged can seldom hope to receive such care from their children, if children exist at all. The complaints and illnesses of children are generally single or few in number. With the aged they are often multiple and closely interwoven with social problems. If child-welfare clinics are still necessary, how much more essential is the need for local-authority consultative health centres for old people, for their age-group has been left behind in the general advance of the public-health services?

In our experience healthy old people will readily submit to a thorough medical examination. Indeed, all the patients who attended the centre willingly accepted a most comprehensive medicosocial and clinical investigation, which now also includes routine rectal examination.

It has been a delight to meet so many interesting and charming old people who have, by their gratitude, confirmed the belief that reassurance based on a complete physical examination is of the greatest value in maintaining morale and well-being.

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HOSPITAL COSTING

THE working party set up by the Minister of Health to devise a system of costing the departments and services of a hospital has now reported.[1]

In July, 1950, the Minister introduced, as an interim measure, a simple uniform system of hospital cost accounting based on the subjective headings of the financial accounts. By this system the cost of each hospital is expressed ultimately in terms of the "average cost per week of maintaining a patient," adjustments being made for expenditure relating to outpatients, on a notional basis, and for vacant staffed beds.

In response to the Minister's invitation, King Edward's Hospital Fund for London and the Nuffield Provincial Hospitals Trust submitted reports on unit costing in hospitals,[2] which agreed that the existing accounting system based on subjective analysis should be replaced by a system based on the departments and services of the hospital. In addition, the Minister received a report from a subcommittee appointed by the treasurers of regional hospital boards, which also advocated the introduction of departmental cost accounting but considered that a subjective accountancy system should be retained and used for defining the cost of individual departments and services within the hospital.

The Minister concluded that a system of departmental and unit costing, supplementary to the subjective analysis of expenditure in, at any rate, the larger hospitals would aid hospital administration and promote efficient and economic spending. Views on the most suitable system differed widely; and accordingly the working party whose report has now appeared was set up, under the chairmanship of Mr. W. O. Chatterton, to devise a practical system.

The working party's conclusions, in summary, are as follows:

For the purposes of internal management all hospitals should consider producing during the year interim cost statements limited to the direct expenses of the departments and services to be separately costed. To allow flexibility, in preparing the interim statements hospital authorities should be free to decide to what extent expenditure should be brought into the cost accounts for each department and service, but they should have regard to the requirements of the annual cost statements to which the interim statements would lead. To be of the greatest possible use to management the statements must be produced without delay after the end of the period to which they relate.

At the end of the year all hospitals should produce annual cost statements summarising in one of two forms (set out in appendices to the report) according to the costing arrangements at the particular hospital. These annual cost statements would also provide the basis for inter-hospital, regional, and national comparisons of costs.

Detailed departmental costing should be introduced gradually. At first only acute and mainly acute hospitals (and hospitals of other types, at discretion) with an annual expenditure, less direct credits, of £150,000 or more should be required to operate such a system. The working party names the departments and services to be listed under this "main scheme"; and it recommends that the average total cost per week of an inpatient should be shown annually in addition to departmental unit costs. Eventually the main scheme should be extended to hospitals with an annual expenditure of £100,000 or more. No management committee or board of governors should for the first two years be required to operate the main scheme in more than one hospital.

Other hospitals should, for the time being, be required to undertake a simpler costing arrangement; and here, as in the main scheme, the average total cost of an inpatient should be produced annually.

The expenditure of particular departments and services should, where expedient, be reduced to costs per unit of work performed.

Much more research and experience are necessary before a departmental costing system can be used as an aid to the central distribution of funds.

The working party emphasises "that comparative costs do not of themselves provide proof of either efficient or inefficient management. They do, however, indicate lines of inquiry which might profitably be followed, but to be of maximum use to management it is essential that enquiries into apparent abnormalities should be vigorously pursued as soon as possible after the end of the period to which the figures relate."

1. Ministry of Health: Report of the Working Party on Hospital Costing. H.M. Stationery Office, 1955. Pp. 52. 2s.
2. See *Lancet*, 1952, ii, 1067.

Public Health

HOSPITAL ISOLATION IN THE CONTROL OF DYSENTERY

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HOSPITAL isolation in the control of infectious diseases needs to be reviewed in the light of the finding that separation experiences in infancy and early childhood may have a deleterious effect on personality development. Dysentery was chosen as the subject of the present review because it leads to the admission to hospital of many infants, and because such admission is seldom necessary for the sake of the patients themselves; its principal purpose is to prevent the spread of infection. It is therefore necessary to consider whether the psychological risk to the individual patients is justifiable and whether the community itself benefits in the end.

Dysentery in Glasgow is briefly described as a basis for discussion of these questions.

Dysentery in Glasgow

The incidence of dysentery in Glasgow is described by Carter and Young (1952) and in the annual reports of the medical officer of health. The number of notifications rose sharply in 1944, since when the annual total has only twice (in 1946 and 1947) fallen below 1000. The total in 1954 was 6242, which is more than double the highest previously recorded. But despite a 9·7 times increase in incidence between the quinquennium ended in 1943 and that ended in 1954, the number of deaths fell from 49 in the earlier period to 21 in the later; this represents a fall in the case-fatality rate from 3·15 to 0·14%.

As to the cause of these changes, two of the suggestions made by Glover (1947), discussing the position in England and Wales, would seem to be particularly relevant: that increasing use of bacteriological facilities has led to the recognition of a greater proportion of the many clinically atypical cases, and that the short-term changes in prevalence are due to an unknown "epidemiological" factor.

With regard to the age-distribution of the disease, in the quinquennium ended in 1954 56·2% of the patients were under 5 years of age, and 80·6% were under 15.

Owing to the housing conditions in Glasgow, some 60% of all patients with dysentery are admitted to hospital; but in children under the age of 5 the proportion is about 70%. This policy resulted in the hospitalisation of 2349 children under 5 in 1954, and of more than 900 in each of the four preceding years. There were also many admissions in which the diagnosis of dysentery was not confirmed.

CASES IN RUCHILL HOSPITAL IN 1954

Severity

Study of 381 patients (119 Flexner, 150 Sonne, and 112 clinical) aged less than 5 years, showed that much

TABLE I—DYSENTERY CASES TREATED IN RUCHILL HOSPITAL IN 1954 (INCLUDING 54 "NON-SPECIFIC ENTERITIS" AND 13 "NO DISEASE" CASES): AGE AND BACTERIOLOGICAL FINDINGS

Age	Flexner	Sonne	Clinical *	Total
Under 1 yr.:				
Under 6 months	21	18	37	76
6–11 months ..	32	46	34	112
	53	64	71	188
1–4 yr.:				
1 yr.	88	125	117	330
2 yr.	79	91	68	238
3 yr.	74	68	34	176
4 yr.	57	71	33	161
	298	355	252	905
5–14 yr. ..	261	235	107	603
15–74 yr. ..	132	76	86	294
75 yr. + ..	4	7	2	13
Total.. ..	748	737	518	2003

* Includes all dysentery admissions (bacteriologically negative) *except* those with definite evidence of some other condition—e.g., salmonella infection, acute infantile gastro-enteritis, cœliac disease.

the same proportion of patients in each of the three groups still had diarrhœa on admission to hospital (51%, 47%, and 54% respectively); but overt blood and mucus were present in only 2% of the clinical group as against 13% and 10% of the Flexner and Sonne groups. Except for the 2% of cases with typical dysenteric stools, there was usually much doubt as to what had caused the symptoms which had led to the admission of the "clinical" cases, but the main reason for admission was fear of the spread of dysentery among the community. Many of the Flexner and Sonne patients were not admitted until the laboratory reports had been received, by which time the disease had often run its course.

In some cases of Flexner dysentery the stools contained profuse blood and mucus, and the degree of constitutional upset was considerable, with pyrexia of up to 103°F. These relatively severe attacks were most common in adults and older children. Only 1 of the 2003 patients (table I) died, and this was due to a side-effect of treatment; the patient, an adult female in the clinical group, developed staphylococcal enteritis while receiving a course of aureomycin; her case was similar to those observed by Hay and McKenzie (1954) after administration of oxytetracycline.

The need for parenteral administration of fluid indicates severity and need for hospital facilities. This form of treatment was used in only 3 cases: the fatality already mentioned, an infant suffering from intussusception as well as Flexner dysentery, and an infant who contracted Flexner dysentery when only a few days old.

Our experience in Ruchill is contrary to that of Boyd (1951) and Hardwick (1955), who state that dysentery is often particularly severe in infants. Apart from the cases already mentioned, only 1 of the 188 patients aged less than 1 year was more than moderately ill. Of 4 patients aged less than 2 weeks, only the 1 given fluid parenterally showed any signs of constitutional disturbance. Our experience is that if an infant with diarrhœa (and usually vomiting also) is severely ill, then he is likely to be found to have gastro-enteritis or some other condition, but not dysentery.

Duration of Stay in Hospital

The average stay in hospital of the 1093 patients aged less than 5 years was 12·7 days. That this period was not longer is due to three measures which were adopted because of difficulty in meeting the demand for beds: (1) treatment with antibiotics was started soon after admission, without waiting for the bacteriological findings; (2) the criterion of freedom from infection was less strict than it often is (dismissal specimens were usually sent on three consecutive days, starting the day after the end of the course of treatment); (3) permission was obtained to dismiss most patients with Sonne dysentery after 11 days in hospital, irrespective of the findings in the dismissal specimens.

Dysentery patients are detained for considerably longer periods in some other hospitals. For example, Harries and Mitman (1951), discussing Sonne dysentery, recommend that dismissal specimens should be taken during a period of not less than 4 weeks, and that patients should then be released from strict isolation only if all the results are negative. Such methods greatly increase the period of hospitalisation, not only because of the delay while taking the specimens, but also because they lead to the recognition of a larger number of convalescent carriers.

Readmission

Only incomplete records are available as to the number of patients who required readmission; for some of our patients may well have been readmitted elsewhere. Especially in the case of patients who were admitted to hospital on three or more occasions, there was usually some social reason why clinical or bacteriological investigations were made—some of the children attended day-nurseries, others came from households in which someone was a food-handler.

Discussion

The Case for Hospitalisation

The proportion of dysentery patients admitted to hospital varies greatly in different parts of the country: thus in Leicester during 1953 only 1·3% were admitted (Ross 1955), in Islington in 1951 7·5% (Freeman 1952), and in Glasgow in recent years about 60%. The explanation of the high admission-rate in Glasgow is that the housing conditions of most of the patients are such that hospital isolation is considered essential. Table II shows that most patients came from overcrowded homes where isolation could not have been attempted; in addition, the water-closet was usually shared by several families. Considering these circumstances, it might well be argued that hospitalisation was necessary both for the sake of the patients themselves and for the sake of their families and the community generally.

HOUSING CONDITIONS AND THE PATIENT

Even if the illness is slight, as it commonly is, it must be very difficult to nurse an infant with diarrhœa in an overcrowded home. None the less, I am informed by general practitioners that most mothers manage to cope, and that the suggestion of admission to hospital is often opposed. These practitioners also stressed that the symptoms seldom last for long, if appropriate treatment is given.

When infants are admitted because they cannot be nursed at home, a further question arises: can they

TABLE II—HOUSING CONDITIONS OF 347 PATIENTS UNDER 5 YEARS OLD

No. of apartments	Patients from households in which the ratio of the total persons in the house to the number of apartments was as shown							
	¾–1	–2	–3	–4	–5	6	–9	Total
1	..	3	8	40	30	14	17	112 (35%)
2	..	35	70	31	9	..	..	145 (46%)
3	2	27	10	1	..	..	..	40 (13%)
4	3	6	6	2	..	..	..	17 (5%)
5	1	1	..	2	..	..	..	4 (1%)
Total ..	6 (2%)	72 (23%)	94 (30%)	76 (24%)	39 (12%)	14 (4%)	17 (5%)	318 (100%)
Institutions	—	—	—	—	—	—	—	29

be dismissed when they are well, or must they be detained until their stools have been shown to be bacteriologically negative? This is essentially the same question as that which is considered next.

HOUSING CONDITIONS AND THE PATIENT'S FAMILY AND THE COMMUNITY

With regard to the welfare of the household contacts of the patients, it was shown by Davies (1952), Shaw (1953), and Ross (1955) that Sonne dysentery is frequently a family infection affecting most of its members. Since Shaw found that most of those who were going to develop symptoms had already done so by the time the first case was notified and routine inquiry was made, it seems unlikely that hospitalisation has much influence on the amount of family spread. Surprisingly Davies (1952) found that the cleanliness of the home has no bearing on the incidence of secondary cases, and the medical officer of health for Glasgow (annual report for 1953) has observed that this is also true of the lavatory accommodation (whether shared with other families or not).

With regard to the spread of dysentery in the community generally, several observations suggest that hospitalisation does not contribute very much to the control of the disease:

(1) It is generally stated that there are many mild cases of dysentery, and temporary carriers, who are not notified, and therefore not subject to control. Carter and Young (1952), for example, speak of the "swarms of occult infections" which must escape notification. The value of isolating those who happen to be notified may therefore be questioned.

(2) Even those patients who are treated in hospital are not necessarily rendered non-infectious, no matter how stringent the dismissal criteria may be. Thus Harries and Mitman (1951) state that Flexner and Sonne carriers may produce positive stools only intermittently, with negative periods lasting for a month or more. And MacLeod (1955), whose dismissal criterion was 12 consecutive negative stools, found that 15% of his patients had positive stools soon after their discharge.

(3) The age-incidence of dysentery suggests that the disease is an endemic and domiciliary infection, from which it seems to follow that, as with measles, routine hospitalisation can play no part in its control (Anderson 1953).

(4) The incidence of dysentery in Glasgow has greatly increased despite large-scale hospitalisation.

THE CASE FOR DOMICILIARY TREATMENT

The risk, which is probably slight, that the domiciliary treatment of dysentery in poor housing conditions would lead to an increased spread of the disease must be weighed against the following advantages:

(1) Patients are less exposed to cross-infection at home than in hospital. This is particularly important in infants.

(2) There are several reports of deaths from staphylococcal enteritis in hospitals in which antibiotics were being widely used (Hay and McKenzie 1954, Choremis et al. 1954) and 1 such death is mentioned in this paper. It has been suggested that the condition is caused by cross-infection in a semi-closed community in which antibiotics are being continuously used over a long period of time, and that it is much less likely to occur in domiciliary practice than in hospital (Anderson 1955).

(3) There is reason to believe that the bacteriological investigation of cases of infantile diarrhœa is often resented by the parents, who fear that a positive result will lead to hospitalisation. If it were possible to reassure them on this point, this should facilitate work on the epidemiology of bowel infections generally, and thus contribute to their control.

(4) It is much less expensive to treat patients in their own homes than in hospital.

(5) To avoid the psychological stress occasioned by a separation experience in early childhood is a positive contribution to mental health. It is necessary to outline the evidence in support of this statement.

Edelston (1943), Bowlby (1951), and others have found in their work in child-guidance clinics that separation experiences in infancy and early childhood may result in serious personality disorders. The typical reaction to a short period of separation is an anxiety state, which may persist only for a short time, or indefinitely. Prolonged separation may give rise to a type of psychopathic personality characterised by inability to form affective relationships with others. Both of these types of reaction have ill effects on society in general as well as on the individuals directly concerned; but the social repercussions of the second type of reaction are particularly striking.

As most of the earlier reports on this subject were based on retrospective studies of disturbed children or adults, it was scarcely possible to assess the risk of any particular type of separation experience. Prospective studies present peculiar difficulties; for, as Bowlby points out, parents often try to conceal, even from themselves, the defects of their children, particularly if they feel, with or without reason, that they are to blame; and affected children may seem to be quite well until, perhaps years later, a stress-provoking situation reveals their hidden weakness. In spite of these difficulties several short-term follow-up studies have been made, from which it is apparent that the risk of damage is considerable. Thus Prugh et al. (1953) found that 15 out of 34 children, aged 2–3 years, had severe reactions, persisting for more than 3 months, after being detained in a medical ward of a hospital for an average period of 1 week. The incidence was much less in older children; in their case, but not so much so in the case of the younger children, it was much reduced by the introduction of special methods, including play therapy, frequent visiting by the parents, and their coöperation in nursing care. None of Prugh's patients was aged less than 2 years, but it is apparent from Bowlby's report and a report by the W.H.O. Expert Committee on Mental Health (1951) that the most susceptible age is between 6 months and 30 months, and that infants of less than 6 months are not necessarily immune. It is generally agreed that separation is particularly undesirable under the age of 3 years, and over that age in cases in which other predisposing causes of neurosis are operative.

Animal experiments (Hunt 1941, Weininger 1954) confirm the general thesis that security in infancy fosters ability to cope with subsequent insecurity.

In an infectious-diseases hospital the severity of the affective deprivation is increased by two factors: first, the barrier nursing technique which makes it difficult for the patient to establish contact with his fellows and with the staff; and, second, visiting is often forbidden or curtailed. The findings of Prugh et al., already mentioned, suggest that these considerations are important.

CONCLUSION

If it is agreed that care of the individual patient is the doctor's first concern, and that this is limited only if it is overruled by a serious threat to the community at large, then it does not seem possible to justify the admission to hospital of infants with dysentery unless this is necessary for their own sake.

Summary

Recent access of knowledge on the harmful effects of isolation in infancy and early childhood necessitates a review of our methods of control of infectious diseases.

Observations are described on dysentery in Glasgow. This disease causes a great many infants to be admitted to hospital, but it is doubtful if this has much preventive effect. Domiciliary treatment could be expected to contribute to mental hygiene and to have other advantages.

I wish to thank Dr. J. Bowlby, of the Tavistock Clinic, and Dr. J. H. Lawson, physician-superintendent, Ruchill Hospital, for the interest they have shown in this paper and

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Outbreak at London Teaching Hospital

On Saturday, July 23, admission of patients to the Royal Free Hospital, Gray's Inn Road, was suspended on account of an outbreak of an acute febrile disorder, which was reported to be glandular fever. By the evening of Sunday, the 24th, altogether 37 nurses and 16 others (mostly medical students) had contracted the fever, which, according to a spokesman, was "unusually infectious,"[1] Last Monday the total of cases increased by 13 to 66 (46 nurses, 17 students, and 3 patients); and admissions to the Liverpool Road branch of the hospital were suspended.[2] On Tuesday the total was 74. One of the first to become ill—a member of the medical staff—has now returned to duty.[3]

The illness, which has high infectivity, is regarded as infectious mononucleosis (glandular fever) with unusual features.

Suicides in Hampstead

In his report for the year 1954, Dr. D. H. Geffen, medical officer of health for Hampstead, examines the causes of the high suicide-rate in that borough.

In 1950 Hampstead had the highest rate for suicides —287 per million population—followed by Holborn (270), Burnley (259), Eastbourne (258), and Westminster (257). In 1951 and 1952 the Hampstead rates were 242 and 189. In 1951, applying the suicide-rate for London to Hampstead, there should have been 12 such deaths: in fact 23 were recorded.

In an attempt to establish the cause of this excess Dr. Geffen has abstracted details of deaths in Hampstead attributed to suicide in the years 1950–53. Part of the excess, he concludes, is associated with the relatively high proportion of the population in social groups I and II. He also remarks that a high proportion of the population of Hampstead, as of other London boroughs with a high suicide-rate, live in lodgings, boarding-houses, or rooms; and some of the excess may be associated with the type of population who leave their own home towns and come to London in search of jobs.

Turning to prevention, Dr. Geffen says:

"By and large there tends to be some impression amongst the public that the person who threatens to commit suicide will not do so. I do not think there is any justification for this impression. A proportion of people who eventually do commit suicide have threatened to do so, or have indicated in their conversation that their minds are turning towards the ending of their lives. In some cases it is possible that in their conversation they are throwing forward hints in the hope that their listeners will help them. In my opinion a threat of suicide should be taken seriously."

Dr. Geffen also urges that the public should have less easy access to dangerous medicines in lethal quantities.

"I do not think it to be a fact that the person who has made up his mind to commit suicide will sooner or later do so. It is likely that the presence of a fatal drug, or an easy means of terminating his life, may cause him to take a fatal step at a time when temporarily his mind is unbalanced."

Referring to fashions in method of suicide (which he has previously termed a "mentally infectious disease"), Dr. Geffen deplores the publicity given to the means adopted by people to end their lives. "I have also seen press reports of cases of attempted suicide. These I think are of no advantage to the public and make it extremely difficult to cure and rehabilitate the would-be suicide, once his friends, relatives and social contacts have become aware of the occurrence."

Birmingham's Health Services

Three years ago the Birmingham public-health department issued a compact "ready reference" to the services they offered. It was intended for the use of general practitioners, but requests for copies from officers of the National Assistance Board, the Ministry of Pensions and National Insurance, hospitals, and voluntary associations showed that many other people found it useful. A new edition has now been compiled which again arranges the public-health services under alphabetical headings, so that, for instance, pig-keeping, pleasure fairs, and plague stand side by side. A practical by-product of the department's close collaboration with the executive council is a new section on the council's service. A loose sheet is enclosed which will probably soon be pinned gratefully over a number of desks, for it tabulates the addresses and telephone numbers in each ward for domiciliary midwives, maternity and child-welfare centres, home nurses, home helps, and day nurseries.

Safe Milk

In Berwickshire all registered dairymen are now licensed for the sale of "certified" or "tuberculin-tested" milk. All the animals in the herds of these producers have passed the tuberculin test and have been declared free from tuberculosis. About 90% of Scotland's 9000 producers of milk now hold licences for "certified" or "tuberculin-tested" milk.

Statistics for England and Wales

The Registrar-General's return for the March quarter of this year [1] shows that the birth-rate was 15·5 per 1000 population, compared with 15·9 in the corresponding quarter of 1954 and an average of 16·4 for the first quarters of the five years 1949–53. The stillbirth-rate was 23·1 per 1000 live and still births; and the death-rate was 15·4 per 1000 population. The infant-mortality rate was 29·0 per 1000 related live births, which was a new record low rate for a March quarter. There were 9840 notifications of tuberculosis, compared with 11,429 in the corresponding quarter of 1954.

A provisional table of the causes of death in England and Wales in the year 1954 shows that deaths from several infectious diseases declined to record low figures; these include tuberculosis, diphtheria, whooping-cough, and measles. The main causes of death which showed a continuing tendency to increase were cancer of lung, leukæmia, vascular lesions affecting the central nervous system, coronary heart-disease, hypertension, motor-vehicle accidents, accidental poisoning, accidental falls, and suicide.

In the second quarter of this year [2] the birth-rate was 15·5 per 1000 population—the lowest rate for a June quarter in any peacetime year since 1936. The stillbirth-rate was 22·9 per 1000 live and still births, compared with 23·1 in the corresponding quarter of 1954. The death-rate was 11·2 per 1000 population, compared with 10·6 in the second quarter of 1954. The infant-mortality rate was 24·4 per 1000 related live births—a new record low rate for a June quarter.

1. *Times*, July 25, 1955.
2. *Ibid*, July 26, 1955.
3. *Ibid*, July 27, 1955.

1. The Registrar-General's quarterly return no. 425. H.M. Stationery Office. Pp. 28. 1s. 6d.
2. The Registrar-General's weekly return no. 28, H.M. Stationery Office. Pp. 20. 1s.

Parliament

Scottish Health Services

THE principal theme of the debate in the House of Commons on July 19 on health services in Scotland was the care of the aged sick. Mr. E. G. WILLIS, one of the members for Edinburgh, said that a recent survey in Edinburgh suggested that the size of the problem had been underestimated. Of over 5000 old people who were examined 40% were found to be in need of some kind of help. If that was applied to the whole of Scotland, which had just over half a million old-age pensioners, some 200,000 would probably be in need of either nursing, hospital treatment, therapy, reablement, or something of that kind. The Edinburgh survey also showed that 22 of the bedridden patients were living alone and 90 were living with spouse only. Of those whose movements were restricted, 112 were living alone and 213 with spouse only. Out of 990 people living alone, 537, or 10% of all those taking part in the survey, were completely bedridden or were restricted in their movements.

Mr. THOMAS OSWALD, another Edinburgh member, believed that, however alarming the findings might appear to be, they were in fact an understatement of the real need. Of the 5086 patients, 1270 required some form of medical attention and that need was not being met. A further 1274 needed home or domestic help and 10% of them needed physiotherapy which they were not receiving. Of the 1270 patients who had some medical need 301 were living alone. 17 were completely bedridden, and 72 restricted in their movements. 304 people, or 6% of the total, needed nursing care. 21 of them needed nursing equipment, although they did not necessarily require nursing assistance. The 658 people needing institutional care was a very low estimate. There were 152 on the waiting-lists and 35 of them were living alone. 5 of them were bedridden and 12 were restricted even in indoor movement. 40 were living with spouse only, 11 were bedridden, and 51 restricted indoors. Of the remaining cases 72 were bedridden.

Mr. J. NIXON BROWNE, joint under-secretary of State for Scotland, recognised that there were still deficiencies in the services for old people. But regional boards had been able year by year to set aside more beds for the aged. In some areas the provision of long-stay beds was probably almost adequate. In most areas the main need was for more beds for assessment and active treatment. Good results were being obtained at units of this kind at Maryfield Hospital, Dundee, and at Stobhill Hospital in Glasgow. The hospital medical staffs engaged in the care of the aged had increased; and it was hoped that the opening of a training school for assistant nurses at Foresthall Hospital, Glasgow, would ease the difficulty of finding nurses for the aged. The number of patients attended by home nurses had been increasing year by year, and it was estimated that about half were aged or chronic sick. Health visitors, too, were being called on more and more to give advice to elderly people. All but two of the 55 local health authorities were providing a service of domestic helps. Scotland was doing rather better than England in providing a chiropody service for old people.

HOSPITAL BUILDING PROGRAMME

Mr. Browne also gave details of the hospital building programme announced in February. Two major schemes, both at the Western General Hospital, Edinburgh, costing between them £640,000, would provide a radiotherapy institute of 100 beds and a neurosurgery unit of 60 beds.

The schemes for 1955–56 included a start on three major projects. The first was the reconstruction of the Westgreen Mental Hospital in Dundee, due to start in September, at an estimated cost of £250,000. The second, due to start in August, was a surgical unit of 120 beds at the Victoria Hospital in Kirkcaldy, at an estimated cost of £450,000. The third, the first phase in the Bellshill Mental Hospital undertaking, was a new nurses' home, which would be started next month. Three schemes, providing between them for about 850 additional mental-deficiency beds, together with ancillary facilities, were planned to start next year, at Ladysbridge near Banff, Baldovan Institution, near Dundee, and the Royal Scottish National Institution at Larbert. The three schemes together would cost about £1,200,000 and take some four or five years to complete.

Plans were being prepared for three schemes due to start in 1957–58. The first was a radiotherapy and research unit at the Glasgow Western Infirmary; the second a large-scale reconstruction of the Royal Mental Hospital at Edinburgh at a cost of £450,000; and the third, the replacement of the Gilbert Bain Hospital, Lerwick, by new buildings at a cost estimated at £250,000.

Together these schemes, Mr. Browne said, would cost just under £4 million. There was also £800,000 to be spent on the work in hospitals—such as heating systems—which would save revenue expenditure. None of the major projects related to tuberculosis. But, without underestimating the size of the remaining task, he was able to report considerable progress in this field. The death-rate from respiratory tuberculosis in 1954 was 20 per 100,000 population compared with 23 in the previous year and 66 per 100,000 as recently as 1948. Even so, there were still over 7000 notifications in 1954, and the final victory was still some way off. Thanks to advances in medical care made possible by the newer drugs, the average period of stay in hospital had been reduced. Furthermore, given good home conditions, more patients could be cared for without entering hospital. In some areas this had been encouraged by administrative rearrangements linking the facilities for outpatient supervision with the hospital inpatient treatment. But the decision on the suitability of patients for domiciliary treatment was entirely a matter for the tuberculosis physician, who had been given no instructions to keep hospital waiting-lists down in that way. For the whole of Scotland the total number of patients awaiting admission was now fewer than 500. This might seem a considerable number, but when it was compared with the figure of more than 9000 admissions in 1954, it fell into proper perspective.

In conclusion, Mr. Browne said that the House of Commons had an inescapable responsibility for the Scottish health services which cost over £60 million of public money a year. It was the concern of the whole House that the best possible value in terms of health should be obtained for this expenditure. They hoped soon to have the advice of the Guillebaud Committee on organisation and administration; but, whatever the committee recommended, they could not hope to succeed without the coöperation of the public, as users of the service, in the avoidance of abuse. The health service was a valuable feature of our national life and we ought to take every care of it.

New Health Service Superannuation Regulations

In the House of Commons on July 19 Mr. IAIN MACLEOD, Minister of Health, explained that these regulations were in the main consolidating, but there were some important amendments to the 1950 regulations. The amendments dealing with concurrent employments were largely to remove anomalies that had arisen particularly among doctors, who seemed more than members of other professions to be engaged in overlapping appointments. The major proposals put forward were that all superannuable service could reckon towards benefit unless there had been a disqualifying break of a year without any superannuable health service appointment. The second main point was that for benefit purposes a medical, or dental, practitioner who had contracts with more than one executive council could be treated with advantage to himself as though he were in a single appointment. Thirdly, a person who gave up part-time employment at, or after, the minimum retiring age, if he ceased to be superannuable in respect of a part-time employment which he still held, could have his superannuation rights preserved in the continuing employment. In accordance with the request of the medical profession, a special regulation had been included to enable doctors who were in partnership to have their remuneration allocated between them in an agreed proportion which could take

into account the amount of remuneration that came from hospital employment.

Future of Remploy

In the House of Commons on July 19 Mr. IAN MIKARDO moved a resolution expressing concern at the increasing number of disabled people who were unable to secure training and employment at Remploy factories and calling on the Government to remove the present restrictions. This year a total stop to new entrants had been imposed and in June only 6196 disabled people were in Remploy. He urged the Minister to strengthen the board of directors of Remploy, to get really tough with the Ministry of Supply and other purchasing departments to get them to place contracts with Remploy; to give Remploy a substantial once-and-for-all grant for capital expenditure; and to enable Remploy to work more closely with similar institutions for handicapped persons, such as the workshops attached to some hospitals and to those run by some local authorities.¶

Sir WALTER MONCKTON, Minister of Labour, in reply, said that he agreed that this was a human problem, but that could not excuse them from looking at the financial problems which were bound up with it. In an ordinary year they placed 120,000 under the D.R.O. service. In the industrial rehabilitation units they trained about 8400 disabled every year, of whom three-quarters went to work outside and to training courses. 4000 people were trained in the Government training centres, and in other sheltered employment there were about 5000 more disabled men. For the six months up to January of this year 1000 people who had been in the Remploy category had gone into open employment.

One of the most encouraging features of the work was that the numbers of people who were disabled and unemployed were going down. In 1948 there were 64,000 people disabled and unemployed on the register. Today the figure was 32,000. The number of people registered as unemployed and needing sheltered employment was over 10,000 in 1948; today it was just over 4000. In 1949–50 the average number of workers in the Remploy factories was 3500. For the first time it reached 6000 in 1952–53 and since then it had always been between 6000 and 6600. Today it was 6150. The loss per disabled man employed was still £400 a year. Probably a fifth of the employees of Remploy were people of low productive capacity who might be said to be capable of no more than 10% of a normal man's production. One had to face that when looking at the figures. He fully appreciated the human side of the problem and he was anxious not to deprive anyone of a chance of producing something, but somewhere a line must be drawn. For himself he assured the House that he genuinely wanted to help Remploy.

Dentists Bill

On July 21 the Minister of Health introduced this Bill in the House of Commons. Its provisions are similar to those of the Bill introduced some three years ago which got no further than the House of Lords.[1] Its main objects are to give self-government to the dental profession by replacing the Dental Board by an independent General Dental Council, and to permit, as an experiment, the training of ancillaries to extract and fill teeth under supervision.

QUESTION TIME

Capital Punishment

REPLYING to a question asking whether the Home Secretary did not agree that there was evidence of a change of public opinion and a change of opinion in the House of Commons on the question of capital punishment, Major GWILYM LLOYD-GEORGE said that in the debate last February[2] he gave, as clearly as he could, the reasons why the Government did not propose to recommend the abolition of the death penalty or the acceptance of the motion for abolition for an experimental period. He gave three reasons, and the last was that he was not satisfied that there was a demand for it by public opinion in this country. On that day the House of Commons supported his view. He did not think that this was a matter which could be decided on the merits or demerits of any particular case, nor did he think it was a subject which could be debated at question time.

Mr. EMANUEL SHINWELL: Does not the Home Secretary agree that public opinion changes from time to time, and that it might be worth his consideration to ascertain the opinion of hon. members?—Major LLOYD-GEORGE: This is a matter which is always being considered. During the last debate I referred to that amending legislation specifically before I came to the question of the abolition of capital punishment. I gave very clear reasons because of which, rightly or wrongly, the Government could not accept the proposition on capital punishment, and I have no reason to alter that at the moment. I go further and say that I see no alteration in public opinion since that time.

Replying to a question, Major LLOYD-GEORGE said that half a pint of beer might be allowed to a condemned prisoner at dinner and again at supper at the discretion of the prison medical officer. Lieut.-Colonel MARCUS LIPTON: How does the Home Secretary reconcile that with the evidence disclosed at an inquest last week?—Major LLOYD-GEORGE: I do not think that I need enter into that, because no information of the sort has been available to me. It has been available to the press, but not to me. The Royal Commission on Capital Punishment put on record its view that the discretion of the medical officer should be indulgently exercised. Mr. JOHN RANKIN: Do I understand from the Home Secretary's reply that no report about this matter was subsequently furnished to him?—Major LLOYD-GEORGE: So far as I can see there is no reason for any report of this sort. We must rely upon the medical officer, who is given full discretion in each case. There is no reason whatever for which it should be referred to me.

Replying to several questions asking the Home Secretary to discontinue the practice of posting outside the prison gates a notice of the execution of a death sentence, Major LLOYD-GEORGE said that the posting of these notices was required by law, but the point had been noted for amending legislation.

Replying to a further question asking what steps he was taking to prevent a repetition of the scenes which occurred outside Holloway Prison on the occasion of the execution of Mrs. Ruth Ellis, he said that the Commissioner of Police had informed him that a crowd of some 250 people formed outside the prison on the morning of the execution and that they behaved in a quiet and orderly manner. The police kept the crowd on the side of the road opposite to the prison, but after the execution the crowd formed into a queue to read the notice and then dispersed quietly. Adequate arrangements were made by the police to prevent any disturbance, and no action was called for on his part.

Mr. H. M. HYDE: Would the Home Secretary not agree that these scenes, which occur with nauseating regularity when anyone is hanged in this country, are a positive disgrace to our civilisation? Would not the best way of preventing them be to abolish the death penalty altogether?

Mr. CHUTER EDE: Has the Home Secretary seen a statement made by certain teachers of the district that some children could see the execution, and boasted that they had seen it? Is there any truth in that statement? If so, can steps be taken to prevent a repetition of such viewing by children of public executions?—Major LLOYD-GEORGE: I have looked at that very carefully, and I find no foundation whatsoever for it.

Replying to a further question, he said that he was not prepared to introduce legislation to make unlawful the public exhibition of wax effigies of convicted murderers. Mr. J. T. PRICE: Does the Home Secretary realise that British opinion has been shocked and scandalised by the gross commercialism of certain showmen in Blackpool who put on exhibition an effigy of Ruth Ellis one day after she was hanged in Holloway gaol? Is this not an element in our public life which is degrading Britain in the eyes of many foreign visitors and also demoralising young people who are taken into these disgusting exhibitions? Will the Home Secretary reconsider the matter and take some action about it?—Major LLOYD-GEORGE: If public opinion is really shocked, it would have been better served if the public had not gone to see the exhibition. They need not go if they do not wish to. It would be hardly practicable, if indeed desirable, to make every departure from good taste in this country, the subject of legislation.

1. See *Lancet*, 1952, i, 363, 649.
2. *Ibid*, 1955, i, 410.

International Ban on Heroin

Replying to a question, Major LLOYD-GEORGE said that, as regards trade considerations, the Association of British Chemical Manufacturers and the Association of British Pharmaceutical Industry were consulted informally before the international ban on heroin was imposed. As regards medical considerations, he consulted the Secretary of State for Scotland, the Minister of Health, and the government of Northern Ireland, and the necessary consultations took place with the statutory bodies set up to advise Ministers on medical matters—namely the Standing Medical Advisory Committee for England and Wales and the Scottish Standing Medical Advisory Committee.

University Salaries

Replying to a question, Mr. R. A. BUTLER, Chancellor of the Exchequer, said that those responsible for future arrangements for determining the salaries of the academic staffs of universities had been giving careful consideration to this matter since it was raised in the House of Commons after his statement on Nov. 16, 1954. He must emphasise that the relationship between the governing bodies and academic staffs of the universities was in important respects different from that between employers and employees. This relationship was unique, and he would be sorry to see any attempt to change it. Its effect was to make inappropriate the development of negotiating machinery of the normal type. Nevertheless, it had been helpful to review the machinery of consultation.

The University Grants Committee would be ready to receive representations at any time as to changes in the basic salary framework for the academic staffs of universities from the Committee of Vice-Chancellors and Principals or from the Association of University Teachers. Thus the association as well as the committee would have a formal right of approach to the U.G.C. It would be the duty of the U.G.C., after examining these representations, and if necessary elucidating them by discussion, to give a considered reply. Before replying the U.G.C. would, if necessary, make a submission to the Chancellor.

The Committee of Vice-Chancellors and Principals would also have full discussions with the association of University Teachers as occasion demanded on general salary questions.

Milk Tablets for School-children

Replying to a question, Mr. D. F. VOSPER said that 91 maintained schools in England and Wales were using dried milk or milk tablets because satisfactory arrangements could not be made for a supply of fresh milk; 21 of them were known to be using tablets in preference to dried milk. Mr. N. N. DODDS: Will the Minister explain why people in the locality can get fresh milk and children cannot get it?—Mr. VOSPER: It is the desire of the Minister that as many schools as possible shall have a supply of liquid milk, but there are certain small isolated schools to which it would not be an economic proposition to supply such milk. The hon. member will notice that since he asked his last question on this subject there has been a considerable reduction in the number of schools without a liquid milk supply, and that is continuing.

Poliomyelitis Research

Replying to a question asking the reasons for transferring a unit dealing with poliomyelitis research to the Gambia, Mr. J. R. BEVINS, representing the Lord President of the Council, said that it was not proposed to move to the Gambia any of the units under the control of the Medical Research Council working in this country on poliomyelitis. The Medical Research Council already had laboratories in the Gambia for research in tropical medicine. Arrangements had been made to send preparations of monkey tissue from there for use in poliomyelitis work in this country. It was also proposed to send out an investigator to study the possibility of finding strains of virus occurring naturally among the relatively immune local population which might be suitable for inclusion in an improved form of the Salk vaccine.

In reply to further questions Mr. Bevins said that the purpose of the recent visit to West Africa by a member of the Medical Research Council's staff was not only to investigate the supply of live monkeys, but also to find out whether monkey-kidney tissue flown to this country was a suitable medium for growing the poliomyelitis virus. The Medical Research Council was at present studying the feasibility of transporting monkey-kidney tissue to this country for use as a culture medium for growing poliomyelitis virus. No arrangements had yet been made for importing live monkeys from areas outside India, but the possibilities were being investigated.

Tuberculosis among Irish Immigrants

Dr. BARNETT STROSS asked the Minister of Health whether he was aware of the high incidence of pleural effusion and progressive primary tuberculous lesions in young Irish girls who immigrated to Britain, and who were free from tuberculosis on entry; whether he had noted the high incidence of pulmonary tuberculosis in the Irish-born population of London, Glasgow, Liverpool, Manchester, Newcastle, Birmingham, and Coventry; and whether he was aware of the fact that they became infected in Britain in most cases.—Mr. IAIN MACLEOD replied: I am aware of certain studies which have been made on these subjects, but no comprehensive statistical information is available about the condition of immigrants on entry or about the time of infection. Nor could such information be obtained without the imposition of fresh restrictions and controls out of proportion to the danger to public health. The same protective, preventive, and treatment services are available to these as to other residents in this country.

Dr. STROSS: Will the Minister agree that that answer is not good enough in reality because this very grievous problem is growing with the increasing number of people entering this country not only from Ireland but from the West Indies and from Africa, many of whom come from agrarian areas and are negative reactors and have no immunity from tuberculosis when they enter this country? Would he therefore not at least ask the Irish ministry of health to assist in seeing that these people are skin-tested or given B.C.G. vaccine treatment before coming here? If many do not then receive that treatment will the Minister ensure that it is given to them when they arrive here?—Mr. MACLEOD: If there is anything useful in the matter I can do with the Irish authorities, of course I will do it.

Clinical Research

Replying to a question, Mr. JAMES STUART, Secretary of State for Scotland, said that 4 out of the smaller group of children living at Bridge of Weir Orphan Home inoculated in October, 1952, with vole vaccine showed late skin reactions, strictly limited to the site of the inoculation in the third year after inoculation. This was in addition to the 20 children out of the group inoculated in October, 1951, mentioned in the reply given on Feb. 15.[1]

Accommodation for Mental Defectives

Replying to a question Mr. MACLEOD said that the numbers of defectives notified as being in need of hospital care and still awaiting admission on Dec. 31, 1954, were:

Region	Low grades		Others	
	Urgent	Non-urgent	Urgent	Non-urgent
Newcastle	203	211	142	357
Leeds	111	60	167	128
Sheffield	328	250	189	265
East Anglia	164	12	91	53
North-West Metropolitan	76	32	146	128
North-East "	105	88	133	241
South-East "	177	242	34	48
South-West "	187	141	97	184
Oxford	86	53	76	90
Bristol	35	31	23	42
Wales	107	136	271	493
Birmingham	270	105	113	120
Manchester	187	57	250	94
Liverpool	101	31	131	41
Total	2137	1449	1863	2284

Replying to a further question Miss HORNSBY-SMITH said that during 1954, 1700 mental defectives were received for short-term care in hospitals and 461 elsewhere. 90 local health authorities in England and Wales had power in schemes approved under section 28 of the National Health Service Act to maintain defectives in these circumstances.

1. See *Lancet*, 1955, i, 453.

In England Now

A Running Commentary by Peripatetic Correspondents

Johnnie B, aged 8½, is the oldest inhabitant of our children's ward. When he was a few months old, his mother left him on the steps of a residential nursery. A few months later he contracted pneumonia and was sent into hospital—it was thought, to die. But, thanks to the sulphonamides, he did not. He has successfully overcome measles, chickenpox, mumps, and whooping-cough, all contracted in the ward. He has no mentality; he makes no purposive movement (save opening his mouth), he cannot see, it is doubtful whether he hears.

For many years Johnnie had no visitor. His mother had turned her back on him, and there was no-one else to come. But about a year ago, the bed next to him was occupied by a boy about his own age who was in for some minor orthopædic business. His mother came regularly—we have visiting every day—and soon noticed that nobody ever came to visit the boy in the corner. So the next time she came, she brought a little celluloid toy for Johnnie; and for the rest of her son's stay she made a point, every day, of saying a few words to him and stroking his hair for a minute or so.

Her own boy is long out of the hospital, but she comes on most Sundays to the bed in the corner, and rarely empty-handed: a small toy, a piece of chocolate, a shaped matchbox. Johnnie cannot see the toy, cannot understand—even if he hears—her words, and we shall never know if he enjoys chocolate. Her visits probably mean nothing to him; but I am sure they are not wasted, and that everybody in the ward is a kinder and nicer person as a result. "Inasmuch as ye have done it unto one of the least of these my brethren . . ."

* * *

We know that the human body, though hating and protesting against any abrupt alteration of its functions, seems able to adjust itself to almost anything if the change is gradual. Jellicoe is said during the first world war to have immersed himself for increasing periods in cold water with the idea of hardening himself so that were he to experience shipwreck he would be to some extent prepared. Happily he never encountered this ordeal, thus depriving himself and us of the opportunity to test the efficiency of his prescription.

The heat exhaustion that recently affected some of the athletes at the White City has stimulated sporting journalists to demand that precautionary measures should be taken to prepare our representatives for the high temperatures they will meet next year at Melbourne during the Olympic Games. Presumably they have in mind graduated degrees of cooking, baking, and boiling. But the matter, it seems, is not as simple as all that. Somebody claiming knowledge and experience of the Australian climate warns us that though heat-waves occur, they also have icy blasts, thunderstorms, cloud-bursts—in fact all the vagaries of an English summer. It seems hardly practicable to prepare for every sort of weather. Moreover, why stop at climate? Why not vaccinate against salmonella, *Staphylococcus aureus*, even *Clostridium botulinus*, the chemicals, and the nebulous toxins responsible for food-poisoning; in a word, a sort of all-comprehending mithridatism?

Which brings us down to earth: just ensure satisfactory general health and fitness and take whatever comes.

* * *

Like all great ideas it came to me in a flash. Having driven my car up one of those super-garages in Town, I was gazing delightedly at the variety of cars displayed. Their number-plates showed the range of possible permutations of the alphabet. And that reminded me that in New York all doctors' number-plates carry the letters M.D., followed by a number. Now, I asked myself, why not go one better and work out full details? Each specialty should have three letters, constituting either a complete English word, characterising the branch, or a well-known, time-honoured set of abbreviations. The surgeons should have CUT, and the P.R.C.S.'s CUT 1. To the physicians could be allocated NYD. Fellow peripatetics might like to help to draw up a full list. So far I have thought of pædiatrician, KID; psycho-analyst, EGO; and geriatrician, OLD. We pathologists propose to claim the prefix PBP.

* * *

Nineteen years ago this month I raked out the glowing embers of our last camp fire on the shore of Elterwater. Tom was packing up the tent; George was gazing wistfully at the cloud patterns across the Langdale Pikes; Dick was fully occupied behind the wall. The ink was drying on our names in the Medical Register, the Final carbuncles were fibrosing nicely in divers places, and an eager world lay waiting.

That Arcadian climax of six years' comradeship and academic tribulations was shattered by the crackling exhaust of an M.G. swirling down the lane. A pair of silk stockings swung over the side and we were driven away to the sweet bondage of medicine and matrimony. A lot of queer things have happened since then. Tom packed up his tent for the last time in the Western Desert; George can still see the outline of Dungeon Ghyll in the haze of his Midland factory chimneys. Dick has graduated to a thunderbox in Rhodesia. I am left to worry whether the Medical Register has lost us, how far away is the final coronary, whether there is time to catch up with the world.

The silk stockings have changed into nylons, the nymph M.G. has metamorphosed into the sedate imago of a family saloon. Matrimony's sweet bondage has yielded the fruits of our labour in the shape of a trio of teenagers, whose genes have stored some mysterious memory of wood smoke and fresh bracken. The camp-fire ashes on the shore of Elterwater have smouldered on into the hearts of the next generation, fanned into flame by the breezes of adolescence, and threatening once more to burn the fingers of our middle age. The family have demanded to be taken camping.

From the darkest recess of the lumber-room we unearthed a couple of tents. The moths and the mice and the mildew betrayed the neglect of nineteen years' callous disregard for the wind on the heath. Yet as the once-white tented little hell, still titled "Pitz Palu," was unfolded on the lawn, a wave of nostalgia swept across the years. I saw it once more pitched on the cliffs of Devon, on the foothills of Snowdon, in the mists of Sligachan on Skye. Strange that those memories should linger when the more fantastic bivouacs of war are thankfully forgotten.

The cupboard in the garage yielded up the primus. I burnt my fingers more than metaphorically instructing the family how to work the flaming thing. The running commentary was almost back to the uninhibited standards of medical student days. The parental example of Swiss Family Robinson was sadly missing. The Queen Bee has collected an enormous pile of blankets, eiderdowns, and cushions, upon which I have heaped scorn but secretly slipped in a couple of camp beds. It is asking a lot of anyone's iliac crest to nestle fourteen stone on a rocky field. The family are now heaving it all into the luggage locker of the car, and the back end is down on the springs. The camp fires will be burning again tonight and nineteen years are rolling away.

* * *

JULY 25

Today is called the Feast of Christopher
The Saint who carried Jesus on his back
To safety o'er the wide torrential stream.
His burden, heavy with the sins of man,
Did tax his strength unto the uttermost.
He's now acclaimed the patron saint of all
Who travel on the road, by air and sea,
By car or 'plane or ship or Shanks's way.
But many mock him by excessive speed:
Their brakes though good cannot reduce their pace
Until too late and they have maimed a child
Or killed an elder man before his time
And those who walk ofttimes compass their fate
For eyes they have but won't survey the scene.
Arise St. Christopher and guard our roads!
So when we drink to thine illustrious name
Death will have vanished from our stricken roads.

Letters to the Editor

SURGICAL TREATMENT OF PULMONARY TUBERCULOSIS

SIR,—Two statements made by thoracic surgeons at the recent conference of the British Tuberculosis Association, reported in your issue of July 9, prompt some comment.

Mr. Holmes Sellors said that when his patients waited eighteen months for operation, 15% did not need operation when their turn came. Similar observations have been made elsewhere, which suggest that the method of planning surgical treatment may nowadays be wrong. With Dr. Hicks, I have drawn attention to this state of affairs.[1] In our paper we did not agree with the trend, noticeable at that time, to leave decisions entirely to the surgeon. We tried to make out a case that the physicians should in the first place decide if surgery was called for. Where conservative medical treatment had proved favourable, then the physician, we thought, should not refer such a case for surgical opinion. The long waiting period for chest surgery in tuberculosis, which exists almost everywhere, is salutary for some patients but for others it induces an anxious often impatient state of mind, so that many who remain well resume work in the interval. As nearly all such patients are under the care of their own doctors and the chest-clinic staff, it is often puzzling to us to know what advice to give when, after a long interval during which clinical and X-ray improvement has been maintained or acquired, we feel that operation is no longer necessary.

To be fair, I believe that, as experience grows, there is now less tendency to leave the decision exclusively to the surgeon; more and more are chest physicians eliciting the surgeon's aid, having already reached their own decision. When they are consulted by a patient who has been recommended perhaps two years previously to have an operation, they may frankly state that, in their opinion, surgery is not necessary.

No-one will advocate precipitate surgery in tuberculosis, having regard to the risks; the operative mortality in resection is of the order of 2%. Especially is the physician guarded when his patient has been sputum-negative from the onset and when clinical and X-ray examinations indicate regression of the disease, or even at times healing during the period of waiting. Even in this type of case, there can be no guarantee that resection of the lesions will not be followed, perhaps years later, by breakdown or spread of the disease. Many patients remain well without operation for long periods, and one regrets the tendency to forget or to minimise the powers of natural resistance.

Surgery in pulmonary tuberculosis is practically a new art; some surgeons have a relatively short experience in the disease, compared with the well-founded experience of many generations of physicians. If both the physician and the surgeon would bear some of these considerations in mind, Mr. Hugh Reid would not again be able to say, as he did at the conference, that physicians often asked surgeons to remove small foci.

Doubtless the waiting-lists for chest surgery in tuberculosis would be much reduced if the criteria and indications for surgical treatment were, as they should be, based on stricter principles.

Industrial Chest Diseases Clinic, Hull. LASAR DUNNER.

TREATMENT OF HYPERTENSION

SIR,—I should like to underline the warning by Dr. Wallace, in his article of July 16, of the dangers of severe depression following reserpine therapy. In a series of 36 cases treated with reserpine, 3 patients became depressed enough to need electroconvulsive therapy and another is having psychiatric treatment. 1 of these patients was receiving reserpine and apresoline together but relapsed (after inpatient treatment) while on reserpine only, and had to be given E.C.T. A further 4 patients became moderately severely depressed; 1 of these improved when 'Rauwiloid' was substituted for reserpine.

These patients were not remarkable for any pronounced fall of blood-pressure, but they were all depressed, agitated, or anxious at the start of treatment. The danger of precipitating a depressive psychosis is then very real, but can probably be obviated by avoiding treatment of patients who show these symptoms.

Apart from Professor Smirk and Dr. McQueen, also in your issue of July 16, Wilkins[1] has pointed out that agitated depression occurs as a symptom of overdosage, relieved by interrupting treatment. A point which has not been elucidated is the relative influence of the drug itself and the effect of repeated hospital visits and blood-pressure readings.

I hope to report the series in more detail later.

Royal Victoria Infirmary, Newcastle upon Tyne. P. S. TWEEDY.

TREATMENT OF INDIRECT INGUINAL HERNIA

SIR,—How very welcome has been Mr. MacLeod's condemnation of simple herniotomy for indirect inguinal herniæ in adults (July 16). In the facts he presents he has finally exploded what I have often felt to be a prize example of surgical muddled thinking. This is usually expressed in some such words as "many early indirect inguinal herniæ in young adults require no surgery other than herniotomy because they are congenital."

What is congenital? The sac? Everything suggests that this is frequently the case. The hernia (i.e., the symptom-producing lesion)? Surely not. We are all familiar with adults giving a history of a few weeks' swelling in the groin, who, at operation, reveal all the features of what we assume to be a congenital protrusion. What process has allowed an empty and symptomless peritoneal sac, present since birth, to become a troublesome rupture after many years?

The evidence, well reviewed in Mr. MacLeod's article, suggests that the fault lies in the posterior wall of the inguinal canal, and that the series of events, beginning with the conversion of a congenital sac into an actual hernia, followed by dilatation of the internal ring, and advancing to increasing destruction of the posterior wall, are but stages of the same condition. If this is the case, there is little to be said in favour of simple herniotomy, for on logical grounds alone this march of events may well continue after such a procedure, allowing recurrence to take place.

When repair by simple narrowing of the internal ring is undertaken, this may be insufficient to halt the sequence, and I would feel that where Mr. MacLeod refers to "errors" at the internal ring being responsible for recurrence, he should in fact be blaming this upon extension of the fundamental process.

His later results confirm what must be the correct conclusion—that attention must be directed to producing the strongest possible posterior wall at the first (and we hope only) operation. Possibly the exact method of doing this is of less importance, and a personal preference for suture of the transversalis fascia combined with a McArthur type of repair, which introduces the minimum of foreign material without gross damage to local musculature, does not detract from the claims of other methods.

If the principles of (1) suture of the internal ring and (2) reconstruction *and* reinforcement of the transversalis layer at primary operation for inguinal herniæ are more

1. Dunner, L., Hicks, M. S. *Tubercle*, 1952, **33**, 308.

1. Wilkins, R. W. *Ann. N.Y. Acad. Sci.* 1954, **59**, 36

widely adopted, I feel we can look for some improvement in the results, which, as Mr. MacLeod shows, leave little room for complacency.

Princess Mary's R.A.F. Hospital, Halton, Bucks. RICHARD R. L. PRYER.

THE MERRYGOWHIMBLES

SIR,—Creevey records that among the preparations made to welcome His Majesty George IV on the occasion of his visit to Ireland was a new Royal Stand at the Curragh race-course. This included a necessary, the seat of which was of a breadth and height to suit the massive royal frame. (Since the measurements could not easily be had, a patriotic Irish peer of similar build volunteered to act as a living model.) Such hospitable foresight was justified. The king had been entertained in the native fashion on the previous evening, and as the horses went down for the start of the first race was "overcome by the merrygowhimbles" and retired to the necessary, from which he emerged only when the racing was over.

The Mews, Widdicombe. HARRY HAWKE.

DANGEROUS COTS

SIR,—I should like to amplify Mr. Staples's remarks (July 16) by pointing out that the 3 accidents referred to all occurred in metal cots with light-gauge tubular rods of $^1/_4$ in. diameter in the sides. The rods were originally spaced $3^5/_8$ in. apart, but were of very flexible material which a health visitor was able to separate to a space of $5^1/_2$ in. The accidents would not have occurred in wooden cots of the domestic type made with rigid wooden bars at spacings of $3^3/_4$ in.

The manufacturers of domestic wooden cots studied the results of the investigations carried out by the Ministry of Health very carefully indeed. They were in full agreement that for metal hospital cots made with flexible rods the spacing should be reduced to $2^3/_4$–3 in. or even less, because of this flexibility, agreeing with the Ministry's view that further fatal accidents must be avoided at all costs regardless of the possibility of minor accidents occurring.

The agreement on metal hospital cots was readily reached on the evidence of the unfortunate accidents which had occurred because of the flexibility of their rods, not on the Ministry of Health's investigations and measurements.

When wooden domestic cots with wooden bars were discussed, however (there is no record of any fatal accident in these cots), the only evidence produced to justify a reduction of the bar-spacing was the Ministry of Health's figures, which at the time of presentation the Ministry officials themselves suggested were more than suspect. In their accompanying memorandum they used such phrases as "Present data must be used with caution," "The mean measurements for each monthly age group differ significantly . . . whether this is a true regional difference or a difference due to technique is difficult to say, but as the differences are greater in some measurements than in others, technique probably plays some part," "Thus, if the figures are accepted . . ."

In the bulletin you refer to in your annotation of June 18, Dr. Elliott and Mr. Hammond stated that the figures showed that the chest depth would prevent all but about 1% of 12-month-old babies squeezing through the bars sufficiently far for the body to hang by the head, and an examination of the figures revealed that this 1% appeared to be exclusively in Birmingham, there being, incidentally, no instances at all in the Queen Elizabeth Hospital. Throughout the whole range of the figures produced by the Ministry, it was those from Birmingham which gave most support to the contention that the bar-spacing should be still further reduced, and to practical people it was obvious that the Birmingham *technique* was responsible for this result, not the Birmingham children.

The manufacturers of wooden domestic cots were unanimous in considering that such figures, upon the validity of which the Ministry themselves had cast considerable doubt, could not be accepted as justifying so important a change. They came to the conclusion that in fact, instead of in theory, no 12-month-old child could get its chest through the existing spacings, and that if it could not get its chest through there was no risk of its being caught by the neck with its body outside the bars of the cot.

There is no question of the manufacturers "taking a flight of their own into the realms of theory" when they suggest that reducing the spacings further would result in a young child, lying on its back, getting its arms or legs entwined between the bars and suffering minor injuries. I have seen a 4-month-old child's wrist broken by getting it caught in a lattice-type cord mesh having a diagonal measurement of something between 3 in. and $3^1/_2$ in. The prevalence of this sort of injury is the reason why the production of this type of cot-side filling ceased 25 years ago.

The insistence on the part of the Ministry that the same sort of risks attach to wooden cots made with rigid bars as attach to metal cots made with flexible bars cannot be accepted by the manufacturers, who might be forgiven for thinking that such insistence is an attempt by the Ministry to distract attention from its own past shortcomings by accusing the makers of domestic wooden cots of producing unsafe goods—when in fact the records show that the manufacturers have been remarkably successful in providing safe cots free from any type of accident, indeed far more successful than the Ministry.

As conscientious, responsible people who have an obligation to the public to supply accident-free articles, they are unwilling to alter their well-proven specification for the sake of providing additional safeguard against a type of accident which remains theoretical as far as wooden domestic cots are concerned, at the risk of causing minor injuries.

R. T. BAVEYSTOCK
Vice-president, Association of Folding Furniture Makers.
London, E.3.

TREACLE FOR CONSTIPATION

SIR,—Mr. Lang Stevenson (July 23) refers to Chaucer's use of the word "triacle." It also occurs in *The Boke of Chyldren* by Thomas Phaire (London, 1545). For the treatment of Terrible dreames and feare in the slepe Phaire recommends: "A litle hony to swallow, and a lytle pouder of the seedes of peonie, and sometimes triacle in a litle quantitie with mylke." He seems to use the word in the modern sense. Earlier it denoted a compound of drugs used as an antidote to snake-bite. As this usually contained honey the word was eventually transferred to mean treacle. In Chaucer's time it was probably still used of a compound remedy, which explains why he says, "unless I have *a* triacle."

Bath. H. R. E. WALLIS.

STERILISATION OF BLANKETS

SIR,—Despite the letter by Dr. Blowers and Dr. Wallace (July 2), I still believe that 'Fixanol C,' in the concentration used for sterilising blankets, is odourless, does not stain blankets, and is effective as a bacteriostatic with a prolonged effect. (In our article[1] we incorrectly referred to fixanol B.) I must acknowledge, on re-reading our paper that the action of soap in antagonising the bactericidal effects of quaternary ammonium compounds is not specifically mentioned. This antagonism of soap is well known, as Dr. Blowers and Dr. Wallace admit. We do not wish to detract from the advantages of 'Cirrasol OD,' but there is such a thing as fair play. The great thing is to convince as many people as possible—particularly hospital administrators—of the desirability of sterilising blankets, using dust-

1. Marsh, F., Rodway, H. E. *Lancet*, 1954, i, 125.

suppressive measures in wards, treating pillows and mattresses with formalin (hot, moist, and gaseous, in the autoclave), and adopting gloves, masks, and gowns for nurses, together with the M.R.C. technique for dressings. These aims should come first.

St. Margaret's Hospital, Epping. FRANK MARSH.

CLINICAL TESTS OF PASSIVE JOINT SENSE

SIR,—My personal indebtedness to the clinical test described in detail by Sir Charles Symonds (July 16) is perhaps of sufficient interest to record.

Twenty-five years ago (1930) I was stricken down by transverse myelitis. On the twelfth day the late Sir Percy Sargent kindly came to see me. I was then extremely ill, expected to die any day, and the prognosis was considered absolutely hopeless. In spite of this, Sir Percy gave me a careful neurological examination. I was completely paralysed below the waist and my answers in regard to sensation were not better than 50%—i.e., guess-work. At the end Sir Percy told me he was to test my big toe, and showed me what he was going to do. I shut my eyes while he carried out the procedure Sir Charles Symonds describes. My answers were immediate, and all were correct. When summing up my case, Sir Percy said: "I do not know what is to happen to you; all I can say is that I can see no absolute reason why you should not in the end almost completely recover except for a little weakness of the peroneal muscles of your right leg." The hope and encouragement inspired by this statement were an important, probably an indispensable, factor in my recovery.

Nine months later, the late Dr. George Riddoch tested me for my fitness to return to work. He used the same technique. I was lying in bed; he did not ask me to get up. He said that the test of the big toe for passive joint sense showed that my sense of balance was unimpaired, and he ordered me to return to work in four weeks, stating that he saw no reason why I should not complete my further ten years as honorary surgeon to Bradford Royal Infirmary. He also informed me that it was upon this test that Sir Percy Sargent had relied in making his remarkable prophecy nine months before.

Bradford. PETER MCEWAN.

CONGENITAL DERMAL SINUSES IN CHILDREN

SIR,—I wish to congratulate Dr. Haworth and Mr. Zachary on their excellent article (July 2). The importance of these sinuses was forcefully impressed upon me while working as senior surgical registrar at The Hospital for Sick Children, Great Ormond Street. I had been taught by Mr. Denis Browne to distinguish between such sinuses as they describe and postanal dimples. He considered that all "sinuses" should be excised when first noted. I was sceptical about the real need to do this until I operated on an eight-month-old male infant for him.

This infant had a sacral sinus such as is shown in fig. 6 of Haworth and Zachary's article. I found that the tract extended down through the sacral hiatus, which opened high on the sacrum. In order to further trace this track and see if there was a cystic expansion at the end, it was necessary to do a laminectomy. The tract appeared continuous with the spinal cord—I think via the filum terminale. I divided it at this point and closed the wound. Postoperatively retention of urine developed and the infant had to be catheterised for a week. When I last saw the infant a few months postoperatively, there was no evidence of urinary difficulty though control had not yet developed (the infant was still less than eighteen months old). The wound healed per primam. Had this infant not been operated on when it was, infection would undoubtedly have ascended and caused either myelitis or meningitis.

There is a difference between these sinuses and normal postanal dimples, which are situated closer to the anus and are caused by intra-uterine pressure. This dimple occurs exactly over the place where one would expect pressure in the fœtal position. By folding up a newborn baby and sitting it on its buttocks, it will be seen that it sits on this dimple. The dimple is an area where there is very little tissue between the skin and the sacral periosteum with a resultant loss of skin mobility. These dimples are never very deep; their bottom can be demonstrated by the manœuvre described by Haworth and Zachary. They do not need to, and should not, be treated.

I do not think it is possible to overstress the importance of treating the other type—the true dermal sinus—in infancy. In such cases the operation is simple, safe, and swift; while the complications if the condition is untreated (meningitis, pilonidal sinuses, neurological dysfunctions) are grave, common, and sometimes lethal.

I wish to acknowledge my gratitude to Mr. Denis Browne for teaching me about these conditions, amongst many other things.

Washington, D.C. NEVILLE K. CONNOLLY.

CONN'S SYNDROME

SIR,—Your account [1] of the discussions on this subject at the recent Atlantic City meetings does not indicate correctly what I said about the relation of aldosterone output to sodium and potassium.

It is recognised that aldosterone and deoxycortone increase potassium excretion and decrease sodium excretion. There is suggestive evidence that potassium and sodium intake have opposite effects on the adrenal cortex. Deane et al.[2] as well as Bacchus [3] have previously shown that either high potassium or low sodium intake stimulates activity in the glomerular zone of the adrenal cortex. Peschel and Race,[4] have noted similar morphologic changes in the adrenal cortex of men after long periods of low sodium intake.

At Atlantic City Laragh and Stoerk reported morphologic observations which were compatible with these previous reports. They emphasised the danger of hyperkalæmia after potassium loading in sodium-depleted subjects. In observations on several dogs and one patient, a direct correlation was found between potassium intake, serum-potassium concentration, and sodium-retaining activity of urine. Since the correlation between serum-sodium concentration and sodium-retaining activity was poor, the effect of sodium on the output of aldosterone was considered to be less important. Inspection of their data, however, showed that sodium-retaining material was detected only in the urine of animals on low sodium intake or of a patient with severe heart-failure, but not in controls on normal diet. Under these conditions, heavy potassium loading produced increase in sodium-retaining activity of urine extracts, while further sodium depletion did not appear to raise the output of aldosterone-like material. My conclusion from these data was that Laragh and Stoerk were measuring in all instances an output of aldosterone which was already fully stimulated with respect to sodium deprivation, but that under these conditions the aldosterone output could be further increased by heavy potassium loads. This differed from Dr. Laragh's interpretation only in the assessment of the relative importance of sodium and potassium in regulating aldosterone secretion.

From observations on normal subjects and patients, our group believe that either low sodium or high potassium intake stimulates the output of aldosterone. Sodium loading depresses the normal output of aldosterone. Potassium depletion may decrease aldosterone secretion, as Singer and Stack-Dunne [5] have shown in rats. The changes which we have observed after sodium depletion are larger and tend to outweigh the effect of simultaneous potassium depletion.

All of these observations suggest that endogenous aldosterone tends to decrease sodium excretion and to increase potassium excretion. Which of these two effects predominates may depend on dietary intake, renal function, and factors which favour the accumulation of sodium in œdema. For example, in the patient with

1. *Lancet*, 1955, i, 1167.
2. Deane, H. W., Shaw, J. H., Greep, R. O. *Endocrinology*, **1948**, 43, 133.
3. Bacchus, H. *Amer. J. Physiol.* 1950, **163**, 326.
4. Peschel, E., Race, G. J., *Amer. J. Med.* 1954, **17**, 355.
5. Singer, B., Stack-Dunne, M. P. *J. Endocrin.* 1955, **12**, 130.

protein depletion or heart-failure, a high output of aldosterone is accompanied by retention of much sodium and water in the subcutaneous tissues and serous cavities. When an adrenal tumour secretes an excess of aldosterone in an otherwise normal man, retention of sodium is limited, and the effect on potassium predominates just as in a normal dog given large doses of deoxycortone.[6]

Stanford University School of Medicine, San Francisco, California. JOHN A. LUETSCHER, JR.

MODIFICATION OF THE HEAF TEST

SIR,—The Heaf multiple-puncture tuberculin test is rapidly establishing itself as a reliable substitute for the Mantoux test, and it also has the great advantage of being a "one-shot" technique. As originally described, however, a platinum loop is used to spread tuberculin solution on to the skin prior to using the Heaf gun. This method thus involves two separate sterilising processes (flaming) and a second implement. Another suggested method—a glass rod—is a non-sterile procedure. A method is now used in this clinic which considerably simplifies and accelerates the test whilst maintaining a sterile technique.

The platinum loop has been discarded and no separate implement is used for spreading the drop of tuberculin applied to the arm: the terminal plate of the Heaf gun alone is entirely adequate for this and the spreading and subsequent release of the needles can be carried out almost in one continuous movement.

An ordinary drop-bottle can conveniently be used for applying the tuberculin, but again this is a non-sterile procedure delivering a drop too large and varying in size. On the other hand, a pipette-type dropping stopper with rubber diaphragm can be used to overcome these difficulties provided the tip is not allowed to touch the skin and is of a bore that yields a drop just adequate for spreading. If a precision type of ground-glass stopper fitting is used the bottle can be used as the permanent container for the tuberculin.

The accompanying illustration shows such a bottle made by Mr. A. R. Ryall, glass-blower to the Postgraduate Medical School of London. Standard 'Pyrex' parts are used (B.10 socket and cone with stem). The pyrex glass is strong and can be repeatedly sterilised by boiling. Using standard parts means that either can be replaced independently without disturbing the accurate stopper fitting. The pipette tip has been made from a small hypodermic needle sealed into the glass tip with 'Araldite' (Aero Research). This has been adjusted in length to reach the bottom of the bottle and provides a small drop of uniform size. The bottle is rendered stable, in spite of its small size (8·5 cm. high), by making it fit the rubber base that is provided as standard for small glass throat-sprays.

This modification of the Heaf test has been acclaimed as a marked simplification of technique by the nursing staff who carry out the majority of the tests in this department.

Hammersmith Chest Clinic, London, W.12. PETER STRADLING.

6. Ferrebee, J. W., Parker, D., Carnes, W., Gerity, M., Atchley, D., Loeb, R. F. *Amer. J. Physiol.* 1942, **135**, 230.

STAFFING THE TRANSFUSION SERVICE

SIR,—Your annotation of July 16 is timely; but some of the centres could reduce the load which they have assumed. At least one centre insists that all antenatal blood-tests from every clinical unit in their area shall be done at the centre, and that no antenatal blood-grouping shall be done even in large and well-equipped hospital laboratories.

If some of this antenatal work could be left to the hospital laboratories, as it is in my area, it would be generally advantageous. First, the load on the transfusion centre would be reduced and it would be able to perform its primary duty—the supply of blood to hospitals. Second, more hospital technicians could become experienced in blood-grouping and obtain the associateship in hæmatology of the Institute of Medical Laboratory Technology, the syllabus of which, contrary to your belief, is loaded with blood serology. Further, the increased experience of technicians at peripheral hospitals would make their cross-matching far more reliable than it is today.

There are some centres which seem to think that no-one in a hospital knows anything about blood-grouping; some hospital workers are beginning to wonder whether these regional transfusion centres know anything about patients, since they prefer to spend their energy in studying rare and obscure antibodies rather than to perform their less spectacular and more laborious primary duty of providing enough blood for transfusion.

Surely the need is for more technicians to be graded as "senior technicians," so that young technicians could leave the transfusion service for a year or two, obtain their fellowship of the I.M.L.T. in a hospital, and then return to a position of responsibility in a transfusion laboratory.

The latest proposals of the management side of the Whitley Council, if adopted, would merely drive technicians out of the service, and offer no help to hospitals or transfusion centres.

Central Middlesex Hospital, London, N.W.10. GEORGE DISCOMBE.

B.C.G. VACCINATION

SIR,—In 1953, when I began using the Heaf multiple-puncture apparatus for tuberculin testing and also for B.C.G. vaccination, I used Old Tuberculin (O.T.) (Koch) and B.C.G. 0·5 mg. per ml. When vaccinating I added a drop of O.T. The local reaction which appeared in three to four weeks was not very pronounced, nor was the degree of allergy produced very marked, and the conversion-rate was about 60%.

In 1955 P.P.D. (2 mg. per ml.) was used for testing and the B.C.G. vaccine was now concentrated by centrifuging. A new technique has been evolved and has yielded much interesting information. The technique is as follows:

B.C.G. vaccine (0·5 mg. per ml.) is concentrated by centrifuging 10 ml. down to 1 ml. (9 ml. of supernatant fluid withdrawn and rejected).

To 2 ml. of P.P.D. 0·25 ml. of concentrated B.C.G. is added. This mixture is used for testing by Heaf M.P. By this method those who are allergic show very definite reactions in from two to six hours. Non-reactors show nothing beyond the pricks, and forty-eight hours later these have disappeared. Thus it becomes possible to read the test the same day as it is performed.

To the concentrated B.C.G. 0·25 ml. P.P.D. is added and this mixture is used for M.P. vaccination. The local vaccination reaction appears in from forty-eight hours to two weeks, depending, it would seem, on the degree of allergy present at the time of testing, for it was observed that true negatives were rare among the children over 9 or 10 years of age. (The presence of the B.C.G. seems to elicit a response to the minutest degree of sensitivity. It occurs to me that perhaps the differences in healing-time and local reaction observed after intradermal injection of B.C.G. may be explained by different degrees of prevaccination allergy among those vaccinated.)

The post-vaccination test shows conversion in from one to three weeks, again depending on the degree of allergy present at the initial test.

The conversion-rate is 100%. There have been no untoward results in over 100 children; the skin is never broken and there is no ulceration with discharge.

Stornoway. R. STEVENSON DOIG.

LONGEVITY IN A TAPEWORM?

SIR,—A married woman of 55 has been passing tapeworm segments for 15 years. She is employed as a cook, but, since she cooks for people and not for cattle, she is not a danger to the public health. She never eats raw meat, but her personal preference for *saignant* over *bien cuit* raises a remote chance of reinfection; however, there has been no period of more than 3 months in which she has not passed segments. In 1949 the persistent parasite was shown to be *Tænia saginata*, but an attack with *Filix mas* failed. She is herself somewhat uninterested in the parasite, whose existence and occasional partial appearance she accepts; but she has recently been persuaded to try the mepacrine cure. (The head has not been found.) The soma seems to keep in step with the psyche in tolerance, for she has no eosinophilia.

This problem in cestode geriatrics is ventilated in the hope that some of your readers may have known still older tapeworms.

Department of Medicine,
The Royal Infirmary,
Manchester 13. D. A. K. BLACK.

DOCTORS AND FIRST-AID

SIR,—Your editorial last week is timely. It is unfortunately only too true that many of us are woefully ignorant of first-aid. The general practitioner usually deals ably with the injured, but the more exotic specialist is often given furiously to think. We suggest that the best way to keep in touch with first-aid, which is the very bedrock of treatment, is service with one of the voluntary organisations. The St. John Ambulance Brigade, as all who attend organised civic or sporting events will know, is able to provide very wide cover, but there is always room for expansion. New members can be absorbed in all grades, whether medically qualified or not; and the surgeon branch, demanding a minimum of twelve hours' work a year and a maximum where the sky is the limit, is ready for volunteers to train new divisions and to replace those who retire under the age-limit of 65. Medical students of at least two years' standing are eligible for appointment as probationary surgeons.

In the Duchy we shall welcome inquiries addressed to the district surgeon, and we feel sure that this applies also to our colleagues in other counties.

VERNON ROYLE
Commissioner

Duke of Lancaster's District,
St. John Ambulance Brigade
15, Mount Street, Preston. ROBERT OLLERENSHAW
District Surgeon.

THE DEATH PENALTY

SIR,—*Indignor quandoque bonus dormitat Homerus!* There may conceivably be a rational case against capital punishment, but the highly emotive language of your leading article on the death penalty in *The Lancet* of July 23 is quite unsuited to its presentation and does not in fact present it, being no more than an incoherent appeal to the emotions. That a collection of men and women already depraved in their tastes, and these further stimulated by a like-minded section of the press, should use the occasion of an execution for still more indulgence in debased behaviour outside a prison, is no more a ground against capital punishment than is the prevalence of shoplifting an argument against opening shops.

That we should seriously be invited to believe that the execution of Mrs. Ellis deprived two children of a "normal home life" is unworthy of your pages and no compliment to your readers' intelligence. The pattern of their lives may be glimpsed from the story of the squalid last weeks of their mother's life before she committed the crime for which she has paid the penalty. "Normal home life" indeed! It may well be that now only does the possibility of this open before these children.

You go on to propose that "any law which, in its enforcement, does gross injustice to innocent people strikes at the whole concept of justice." What confusion of thought and what muddled ethics are here. It is apparently in vain that the enterprising editors of the Penguin Classics have made a translation of Aristotle's *Ethics* available for half a crown—less than the price of two copies of *The Lancet*.

It is not the law which is guilty of injustice to the innocent in this instance. It is the criminal herself who by her crime inflicts injustice upon her children, for it is her act that has made them suffer, and would have done so for the rest of their childhood even had her sentence been commuted to penal servitude. When a footpad robs with violence, is convicted and goes to prison for a long term, his innocent dependants—if he have any—suffer grave injustice in the form of distress, economic loss, the break-up of a family circle, and public humiliation. But is the law to be blamed for this injustice, and must the offender—as greatly against his family as against the State—go free and not to prison? In short, your article is, I must submit, barren of any rational concept of justice or appreciation of the rule of law.

Finally, I read that "we gild the worst of crimes with publicity." Who, pray, are "we"? Surely no more than a cynical section of the press which, under the fiction of "serving the public interest"—surely the most hypocritical fiction of our time—stirs up the mud and rakes the muck when sordid crimes such as the three you cite have been committed. If we were so fortunate as to enjoy a universally high-minded press, most of the objections—such as they are—that you urge against capital punishment, would vanish. But that we should be invited to abolish capital punishment because we have not got such a press (and this is the clear tenor of your argument) is a crazy proposition.

The injustice suffered by the innocent from the carrying out of the criminal law comes not from the law, but from the criminal himself and from those who for gain exploit his squalid life and crimes.

London, W.1. F. M. R. WALSHE.

SIR,—I think most people, and certainly most doctors, feel slightly sick when they read of, and visualise what actually happens at, an execution. The recent hanging of a young woman in the prime of her life was particularly nauseating. Is it not time that we doctors, the medical profession, unitedly denounced this senseless destruction of life for what it is: inhuman, barbaric, cruel, pointless and vindictive?

Deaths due to disease are tragedy enough; deaths due to accident are worse. But to think that we can deliberately and cold-bloodedly take it upon ourselves to authorise the death of a fellow human being is degrading and disgusting to the worst possible degree. There is also the ethical side of the matter. How can doctors, whether directly as prison medical officers, or indirectly as citizens in a democracy, have anything to do with the deliberate taking of human life? Our duty, our calling, is to prevent death and suffering and no other step can be condoned on any grounds whatsoever. I seriously question whether it is ethical for prison medical officers to assist in any way at an execution, to be present, to certify death, or to perform a post-mortem examination afterwards. If the authorities insist on carrying out this revolting undertaking, then they must do it alone, without the slightest help from us.

The public conscience has already been partly stirred. Unfortunately there are no half measures about death. Let us, as a profession, do all we can to induce

the Government to think again, to go the whole way and abolish the whole filthy business once and for all.

Geneva. W. NORMAN TAYLOR.

SIR,—It is surprising that, so far as I know, no study of reactions to executions, using the techniques of Mass Observation, has been published. A great amount of material is available, and might include not only views expressed in the general press, but also from your own leading articles. As to the execution of Mrs. Ellis, I doubt if you are right in saying that "unwholesome excitement was shared by children up and down the country." I have many opportunities of meeting children, at home and elsewhere, and I doubt their interest in the case. There are odd characters who may lift their children to read death notices, or take them to shows of relics of murderers; but this merely illustrates the well-known fact that there are odd people.

It is urgent that strong restraint be placed on press reports of crime.

In the Christie case, many doctors of long experience must have learned much that was new to them, both in physical pathology and in psychopathology. Surely it is unnecessary and undesirable to publish detailed evidence in such cases. For the expert these matters are to be found in technical works; for the ordinary man they have no value, and are indeed harmful. The law has already restricted the publication of certain evidence in divorce suits, and controlled "horror comics." The breakfast-table is no place for a refresher course on the abnormal.

As to capital punishment in general, it may be that much of the debates that now precede, and follow, every execution arises from a misconception of the function of the courts.

Judges have often pointed out that the courts are courts of law, *not* courts of morals. The McNaughten rules are really based on moral theology, which assesses human acts on the bases of gravity of the act, knowledge of the agent, and volition of the agent. A man can reach no certain judgment on the absolute moral value of the act of another; his judgments are practical and inferential. A court makes a practical judgment as to whether the accused has broken an empirical code, which in general does, but not necessarily, correspond to moral standards. If we cease to regard the McNaughten rules as having a moral value, and cease to give to the courts a function, which they themselves disclaim, of making moral pronouncements, then the rules are seen as useful empirical standards, and the courts as the instruments of practical policies.

Capital punishment is not a penalty for a moral offence: it is a practical decision to remove permanently from the community a person who has made himself unsuitable to continue in it. The surgeon who excises a malignant focus makes no moral judgment on its cells; the battery commander who shells an unseen position does not judge the men holding it; the decisions are practical.

Again, we cannot really judge of the deterrent value of capital punishment. It may be that the execution of a Christie did assist some abnormal minds in achieving repression of certain tendencies; the knowledge of sanctions to be imposed may have a value even at the level of conditioned reflexes. It may be that the fact that the community does not accept sexual passion and jealousy as grounds for homicide has a value in maintaining for the whole community its background standards of conduct.

Finally it is to be hoped that some alternative to the present use of psychiatric evidence can be found.

It is far from edifying to the profession itself, and indeed to the lay public, to see that in most cases of homicide the defence can so often find evidence of psychic abnormality, the prosecution of "normality." "Blackouts" have long been a jest among doctors: they are becoming a byword with the laity. It is odd that such evidence is so largely confined to charges of murder. Do forgers, adulterers of milk, and share-pushers not also suffer from these disorders?

I suggest the basic principle in considering punishment, and not only capital punishment, is that the courts are courts of law not courts of morals. In the matter of adultery we are content that the courts should enforce laws designed for the convenience and stability of the community, and not concern themselves with higher considerations of morality. Why not take the same view for murder?

Todmorden, Lancashire. R. C. WEBSTER.

SIR,—If the death penalty is intended to protect the public, then surely no insane person should escape it if he commits a murder? Straffen will remain a potential threat to children until he dies, whereas Bentley, Mrs. Cristofi, and Mrs. Ellis would, had they been reprieved, quite possibly have harmed no-one afterwards.

Your leading article, which adduces strong arguments against the belief that hanging is a deterrent, may provide the Home Secretary with the evidence that there is a widespread feeling against capital punishment. What is to be feared is that, if this feeling continues to be ignored, juries will do as they did when hanging was the punishment for theft. They will refuse to convict.

London, S.E.12. W. A. LITTLEJOHNS.

SIR,—I should like to congratulate you on your leading article. Surely the term "capital punishment" is an anachronism. In an enlightened age the chief object of punishment should be the correction and reform of the individual delinquent. It may be that the time is not yet ripe for the complete abolition of the death penalty; maybe the community is justified in ridding itself of a public menace; but having decided that such a measure is necessary the offender should be liquidated by the most humane method possible—which is certainly not hanging.

Among the most macabre features in the report of the Royal Commission were the details of the three weeks in the condemned cell. Surprisingly, the witnesses (including an eminent psychiatrist) appeared honestly to think that the procedure was humane. Physically the prisoner is well-treated—indeed no effort is spared to ensure that he is delivered to the executioner in good condition. All day and all night he (or she) is watched by two warders so that he has not a moment of privacy in which to think or pray, or to obey the calls of Nature. Surely reasonable precautions against suicide could be taken without this? Witnesses took pride in the fact that only about 90 sec. elapsed between the entry of the hangman and the drop. To effect this it seems that the scaffold is erected immediately adjacent to the condemned cell so that the victim sits for three weeks facing a wall which alone separates him from the gallows; he may also be aware of a peep-hole through which the hangman can watch him for technical details. By comparison, the ride to Tyburn seems humane, especially as in those brutal days most of the victims were fuddled with alcohol.

After the recent execution of Ruth Ellis, the pathologist who made the post-mortem examination thought it necessary to draw the attention of the coroner to the fact that there was a small quantity of brandy in the stomach. I had always hoped that prison medical officers contrived to arrange for condemned persons to be doped at the last. From the surprise expressed that somebody at Holloway Gaol had had the humanity to give Ruth Ellis a glass of brandy one fears that such hopes were without foundation.

Horley, Surrey. T. W. PRESTON.

SIR,—The ethical basis of capital punishment is, to say the very least, extremely shaky; but the ethics of prolonged imprisonment are far less often considered. As the law stands, the convicted murderer is condemned to death, but may be reprieved and then serve a life-

sentence. When this happens those of us with vivid imaginations and more or less kind hearts do not find our breakfasts spoiled by the thought of the hideous paraphernalia of hanging; and, being made as we are, the thought of the horror of long imprisonment is soon forgotten. In the most recent case, there is no doubt that many people would have been much happier if the murderess had not been hanged; but how would she have fared during years of prison? Prisoners are still human; and it is surely the duty of penologists to find some means of avoiding the degradation that is an ineluctable part of long imprisonment.

The "shattering psychological blow" to the children would be almost equally great if they had to remember that their mother was in prison for murder. It is a charming idea that "Any law which, in its enforcement, does gross injury to innocent people strikes at the whole concept of justice"; but even in Erewhon and Utopia the same thing happened.

London, W.1. A. PINEY.

Medicine and the Law

An Emergency Case

ON July 21 London Executive Council considered a case in which a general practitioner had failed to respond to a call for emergency treatment of a patient who was not on her list.

Mr. Y and Mr. Z were travelling to work by tube train at about 7.40 A.M. when Mr. Z suddenly became ill, experiencing severe pains in the abdomen. Mr. Z was in a semiconscious state, and when the train stopped at a station Mr. Y, with the help of a third person supported him into the street. Mr. Y thought that Mr. Z might recover in the open air, but as he did not do so Mr. Z was assisted across the road to the steps at the entrance of a pathway leading to the surgery premises of Dr. X. Here Mr. Z was propped up in a sitting position while Mr. Y rang the door-bell, the door being about eight or ten yards away.

The call was answered by Dr. X, and Mr. Y explained that a man had been taken ill in the street. Dr. X (who was in a dressing-gown) offered no advice or assistance beyond telling Mr. Y to call an ambulance; she then closed the door. Mr. Y believed that Dr. X must have seen Z sitting at the foot of the steps because the path was a straight one. He agreed that, having called for an ambulance, one arrived within three or four minutes.

Dr. X admitted that the evidence given by Mr. Y as to the incident at her front door was largely true. She stated, however, that she had suffered a very bad night and had taken sleeping-tablets. She was in bed asleep when the bell rang and merely put on a dressing-gown over her night-clothes and did not take her glasses with her when she went downstairs to answer the door. She opened the door a little way, sufficiently far to take in a letter from the caller whom she had expected to be the postman. There were, however, two or possibly three men standing in front of the door, from one of whom she gathered that a man had been taken ill in the street. This suggested to her that a street accident had occurred, and with this thought in mind she was of opinion that the advice to call an ambulance was perfectly good and the quickest way of obtaining assistance; there was an ambulance station nearby and she knew from experience that an ambulance would be at the scene in about three minutes. She suggested that it would have taken her nearly as long to go upstairs to get her spectacles. She was firm in her statement that she was unaware that the patient was at the foot of the path. As to Mr. Y's request to telephone for an ambulance, Dr. X said that there were three telephones adjacent to the surgery.

Mr. Y, with the approval of Mr. Z, made a complaint to the executive council. The medical service committee considered that Dr. X had failed to comply with the terms of the allocation scheme and thus with the terms of service. It recommended that Dr. X be cautioned. The executive council adopted this recommendation, against which Dr. X is entitled to appeal to the Minister.

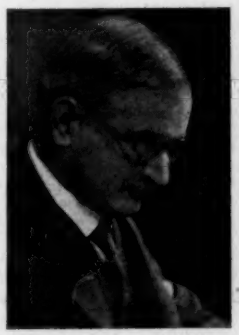
Obituary

JOHN BRIAN CHRISTOPHERSON

C.B.E., M.A., M.D. Camb., F.R.C.P., F.R.C.S.

Dr. Christopherson, the first director of medical services appointed by the Sudan government and the originator of the treatment of schistosomiasis by intravenous injection of antimony, died on July 21 at his home in Gloucestershire at the age of 87.

He was born at Batley, Yorks, the son of Canon Brian Christopherson, later rector of Falmouth. From Clifton College he went to Caius College, Cambridge, and to St. Bartholomew's Hospital. After qualifying in 1893 he continued his studies at Vienna. In 1896 he was elected assistant surgeon to the Albert Dock Hospital, where James Cantlie was his chief; so he was closely associated with the London School of Tropical Medicine in its teething stage and came under the influence of Sir Patrick Manson. In 1897 he took the F.R.C.S., but his promising career in London was interrupted by the South African war for which he immediately volunteered. He became surgeon to the Imperial Yeomanry base hospital at Deelfontein, and after the war he did not return to England but joined the newly formed Sudan Medical Service, as physician to the inspector-general, Slatin Pasha. In 1904 he was appointed the first director-general of medical services by the Sudan government.



[*Lafayette*

In this influential and important position he became closely associated with the Wellcome Laboratory in Khartoum and with Andrew Balfour and Robert Archibald. He was also connected with Gordon College in the early stages. Five years later he resigned his appointment to become director of the civil hospitals in Khartoum and Omdurman. There he had access to a great deal of clinical material and became interested in leishmaniasis, schistosomiasis, and leprosy. In 1913 he was elected F.R.C.P.

The outbreak of the first world war again disturbed his career, and he accompanied Sir James and Lady Berry's Red Cross unit to Serbia and acted as surgeon at the temporary hospital at Vrynatcha Banja. While there he saw a great deal of typhus, relapsing fever, malaria, and other diseases which afflicted the harassed and stubborn Serbian armies. When taken prisoner by the Austro-Hungarian forces, by a flick of fickle fortune, he was rescued by his friend Slatin, who as an Austrian national had remained in his own country where he happened to be on leave on the outbreak of war. On his release Christopherson immediately went to France as secretary to the War Office commission on medical establishment with the B.E.F. This task accomplished, he returned to Khartoum at the end of 1916. There he was in charge of three patients with kala-azar (leishmaniasis) whom he found were also infected with schistosomiasis. He decided to treat them with intravenous injections of sodium antimony tartrate (tartar emetic), a remedy which had been introduced by Sir Leonard Rogers in 1914 in Calcutta, and which had been used even earlier in dermal leishmaniasis by Gaspar Vianna in Brazil, and in kala-azar by Di Christina and Caronia in Sicily. Christopherson noted with surprise that as the kala-azar regressed, so the eggs of *S. hæmatobium* began to disappear from the urine. They also became opaque and failed to hatch on being placed in water. The contained miracidia were dead. He followed up his cases methodically until he was satisfied that they were cured of schistosomiasis and that the parent flukes were no longer active. Later he learnt that Mr. J. E. R. McDonagh had in 1912 injected 23 cases of urinary

schistosomiasis, contracted during the Boer war, with antimony tartrate, though he had not been able to follow them up in the same systematic manner.

On his return to civil life, and after his retirement from the Sudan, Christopherson was in charge of the bilharzia clinic of the Ministry of Pensions, where he supervised the treatment of the soldiers who had contracted schistosomiasis during war service. For this work he was appointed C.B.E. in 1920. About this time, to the astonishment of his friends, he also began to specialise in pulmonary diseases, and in due course he became a physician to the London Chest Hospital at Victoria Park, where he established a considerable reputation. He was also physician for tropical diseases to the Royal Masonic Hospital, and had a busy consulting practice. He continued to take a keen interest in tropical medicine and he regularly attended the meetings of the Royal Society of Tropical Medicine and those of the tropical section of the Royal Society of Medicine, of which he was president in 1929–30.

In the early 'thirties he retired to his country estate at Lydney-on-Severn, to busy himself with horticulture and country pursuits.

P. M-B. writes: "Christo was a charming personality: he was of an inquisitive disposition with an active mind. Dark, with beetling eyebrows, he spoke with a rather hesitant manner and, on that account, was not a very good lecturer, but he could dissimulate his little stammer with a pleasant and infectious laugh. He was a kind soul and a pleasant companion who never spoke ill of any man. He was also deeply religious and a good Christian. He was a good friend to the Church and for many years medical adviser to the University Mission to Central Africa. When roused and when he knew he was in the right he could be firm and tough. Usually he won through. Christo's name will live long in the annals of tropical medicine and in the hearts of his many friends."

Dr. Christopherson married, in 1912, Joyce Eleanor, daughter of the late Dr. J. A. Ormerod.

HUGH JAMES McCURRICH

M.S. Lond., F.R.C.S., M.R.C.O.G.

Mr. H. J. McCurrich, senior consultant surgeon at the Royal Sussex County Hospital, died at his home in Hove on July 16 at the age of 64.

One of four children of the late John Martin McCurrich, chief engineer of the Bristol and Avonmouth Docks, he was educated at Clifton College and St. Bartholomew's Hospital. He qualified in 1915 and joined the Army as a combatant, but later served as a captain in the R.A.M.C. Invalided on account of trench-foot he resumed his civilian medical career. At St. Bartholomew's he was house-surgeon to the late Sir D'Arcy Power, and afterwards resident midwifery assistant and demonstrator of obstetrics. He took the M.B. Lond. in 1922 and M.S. Lond. in 1923, and became F.R.C.S. the same year. After further resident appointments at the West London, Putney General, and Royal Masonic Hospitals, he was appointed resident surgical officer at the Royal Hospital, Sheffield. From Sheffield he came to Brighton in 1925 as medical superintendent of the Brighton Municipal Hospital, later known as the Brighton General Hospital. This was an admirable appointment, giving full scope to McCurrich's clinical and administrative abilities. To him is mainly due the complete transformation which took place in this institution during his term of office. In his Rogers prize essay in 1926 he sketched the development of hospital and public medical service from Saxon days to the present time and he foresaw much of the pattern of development of the hospital service which was to become an accomplished fact twenty years later.

After serving two years as surgeon to the Hove General Hospital he was appointed assistant surgeon to the Royal Sussex County Hospital in 1931. He took the M.R.C.O.G. in 1935, and became gynæcologist to the hospital in 1939 and full surgeon in 1946. He was also consultant surgeon to the Victoria Hospital, Lewes, and he continued to serve for some time as consultant surgeon to the Brighton General Hospital.

He served a term as chairman of the Brighton division of the British Medical Association and was also on the council of the association. He was president of the Brighton and Sussex Medico-Chirurgical Society in 1946–47, the centenary session of the society. His presidential address was a most valuable and interesting review of the political and social conditions at the time when the society was founded in 1847 and their local effects, the outstanding medical achievements during the century which followed, and a brief account of the society and its reaction to the discoveries of this epoch. By a happy thought this meeting was held in the council chamber of the town hall, in which building the first meeting of the society was held in 1847.

In 1944 he founded the Association of the Honorary Staffs of the Major Non-teaching Hospitals of England and Wales, being impressed by the need for an association to represent these staffs during the discussions taking place before the passing of the National Health Service Act of 1946. Never a man to be deflected from any task to which he put his hand, he succeeded in putting this association on a sound basis and he was its first president from 1944 to 1947 and again when the association took its present title of the Regional Hospitals Consultants and Specialists Association during 1949–50. Few men could have achieved such a success in the midst of a busy professional life. He was a member of the Brighton and Lewes hospital management committee from its formation in 1948 until his death, and chairman of the group medical committee from 1948 until last March.

Though so actively engaged in medico-political affairs, he never allowed his professional work to suffer. He won the respect and affection of a wide circle in his profession, and both the Royal Sussex County and the Brighton General Hospitals owe much to his energy and devotion. He made many contributions to medical literature, always interesting and often original and with a happy gift of humour. His chapter on gynæcological procedures in *Pye's Surgical Handicraft* and an article in the *Journal of the International College of Surgeons* last year on "A method of restoration of the bile flow after damage to the common bile duct" may be mentioned as among the more important. Always outspoken and fearless and somewhat impulsive in nature, his life was a hard one, for the burden of work which he undertook was enormous and he suffered many discouragements without flinching. Few men could have carried this load with such apparent ease. He carried on to the end, to the amazement and admiration of his many friends. He had many interests outside his profession, in particular sailing, and he found time for social work at the Brighton Boys' Club, of which he was vice-president.

He was twice married, first to Dorothy Bettine Ellis, who died in 1951, leaving two sons and a daughter, who survive him with his second wife, née Norah Shaw.

J. R. H. T.

Sussex has lost a great personality in Hugh McCurrich. His stocky figure, ruddy complexion, and alert bearing made him outstanding; with his clear mind and forceful character he was a leader, especially since the beginning of the health service when so many controversial points have arisen. He was prominent in the formation of the Regional Hospitals Consultants and Specialists Association which came to be known in this district as "McCurrich's Society."

He was always a fighter, always fair, and always friendly. An admirable chairman, his presidency of the Medico-Chirurgical Society of Brighton and Sussex was noteworthy. It was the jubilee year and his presidential

address consisted of an admirable history of the society which he had reprinted and presented to every member. He later presented further copies to be given to each new member.

He had an open mind always advancing to new techniques, and almost to his dying day was taking an interest in medical affairs. He showed his great courage first when he resigned from his post as medical superintendent to the Brighton Municipal Hospital on his election as an honorary surgeon to the Royal Sussex County Hospital and launched into private surgical practice. This courage was again evident to all in his last months when he knew he was a dying man.

G. M. W.

Hugh McCurrich will always be remembered as a staunch and steadfast friend. In all relations with his patients he was invariably a conscientious doctor and a skilful surgeon. He was sure of his experience yet always keeping an open mind for new ideas from whatever quarter they might come. He never made any claims to literary talent, yet wrote clearly and forcibly and always to the point. When speaking in public he was forthright yet restrained, capable of expressing the common-sense point of view most effectively. He appeared always to be complete master of himself and all his affairs. It would seem unthinkable that he should even ask for any concession, advantage, or privilege for himself. Though strict towards himself he was always charitable to others. Though fully aware of human proneness to error, he was always willing to look beyond this to the solid and good in other people, however deeply it might appear to be buried.

In his last illness he showed an unforgettable example of manly courage, continuing quietly at work, seeking to restore to others the good health which he well knew was now denied to him. When his name is mentioned his friends will always recall his upright carriage, his cheerful expression, his strong confident voice, his genial good humour, his sound common sense, yet rare and delicate gentleness.

C. E. D.

Appointments

ADAMS, A. S., M.B. Warsaw, F.F.A. R.C.S.: consultant anæsthetist, Glantawe H.M.C.

CROWLEY, P. J., M.B. Camb., M.R.C.P.I.: whole-time asst. psychiatrist (S.H.M.O.), Pewsey Hospital, Pewsey, Wilts.

DANKS, SYLVIA, M.B. Lond., F.F.A. R.C.S., D.A.: part-time consultant in anæsthetics to the hospitals of the Reading H.M.C.

KREEGER, I. S., M.B. Lond., D.P.M.: asst. psychiatrist (S.H.M.O.), department of psychological medicine, King's College Hospital, London.

MCKENNY, J. G., M.B. Belf., D.OBST., D.P.H.: asst. M.O., co. Antrim.

OWEN, GORONWY, M.B. Wales: whole-time M.O., regional blood-transfusion centre, Sheffield.

REES, R. L., F.R.C.S.: consultant orthopædic traumatic surgeon, West Wales and Mid-Wales H.M.C.S.

ZAUFAL, A. T., M.B. Beirut.: whole-time asst. psychiatrist (S.H.M.O.), Morgannwg Hospital, Bridgend, Glam.

Appointed Factory Doctors:

ALLEN, I. C., M.R.C.S.: Framlingham, Suffolk.

CHAPMAN, D. I., M.R.C.S.: Harleston, Norfolk.

EDWARDS, E. D., M.B. Wales: Abertillery, Monmouth.

LASCELLES, B. D., M.B. Lond.: City of London.

Leeds Regional Hospital Board:

DRENNAN, J. D., L.R.C.P.I.: whole-time senior casualty officer, Hull Royal Infirmary.

HAPPEY, MARGARET G., M.B. Sheff., D.M.R.: whole-time asst. radiologist to the Leeds (A) and (B) groups.

MUNRO, D. E., M.B. Glasg., D.P.M.: whole-time asst. psychiatrist (S.H.M.O.), Stanley Royd Hospital, Wakefield.

Births, Marriages, and Deaths

BIRTHS

BREWERTON.—On July 24, at the South London Hospital, to Joan (formerly Wells) and Derrick Brewerton—a daughter.

Notes and News

PROTECTION AGAINST RADIATION

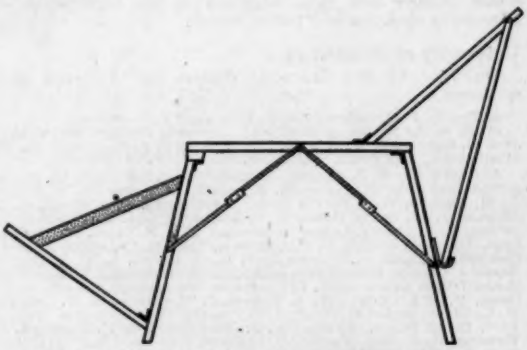
THE rapidly increasing range of radiation sources, due to the development of artificial radioactivity and the introduction of supervoltage therapy, have necessitated wider and fuller regulations for protection against radiation, now published in a supplement of the *British Journal of Radiology*.[1] Reports by six subcommittees of the international commission cover the permissible dosage for external radiation and internal radiation, protection against X rays of up to and over two million volts, protection against neutron and proton particles, and the disposal and handling of radioactive isotopes. Protection in X-ray diagnostic departments and against X rays from apparatus for non-medical applications are also discussed in full. No department which deals with any form of radiation should be without this supplement.

A FOLDING-CHAIR

THE folding-chair shown in the accompanying figures was designed for a person with two stiff hips who was unable to sit in any ordinary seat or chair. One disadvantage of an ordinary wheel-chair is that it is usually impossible to stow it inside a car's luggage boot. But when, as in this case, the person can walk a little, there are many occasions when, having arrived by car, the need is only for a seat with a back sloping at an angle of about 140°.

Wood was chosen for this chair because there were doubts about the most comfortable angle and proportions, and some trial and error seemed likely. The measurements were very much the same as those of a wheel-chair. The chair collapses into a space of 17 × 27 × 5 in. and is then easily carried in one hand.

1. Recommendations of the International Commission on Radiological Protection. *Brit. J. Radiol.* 1955, suppl. no. 6. Pp. 92. 10*s*. 6*d*.



The legs, seat frame, and back frame are of $^3/_4 \times 1^1/_2$ in. timber, and all joints are morticed, except those of the leg cross-bracing which are tenon joints. The four hinged stays are of $^1/_2 \times ^1/_8$ in. steel, and they "break" inwards towards the leg-unit main hinges. But to make them fold evenly with the chair units, each stay *must* be hinged at its own centre-point and it must also be attached (by large screws or bolts to the outside of the seat and leg units) at points equidistant from its respective leg-unit main hinge.

The support for the back-rest is of aluminium L-channel of $^1/_{10} \times ^7/_{10} \times ^7/_{10}$ in., cross-braced by a $^1/_{10} \times ^7/_{10}$ in. aluminium strip riveted to it. The wooden bar across the bottom of this unit rests on two curved supports of $^1/_8 \times 1^1/_2$ in. aluminium, but as the back legs fold in first these supports swivel in on their single screws so that the front legs (mounted on a wood strip of compensating thickness) can then fold in flat. The top attachment point is a spindle welded into a slot in a small steel plate screwed to the back. The back and seat frames are covered with camp-chair canvas, and the five-ply foot-rest is supported by webbing straps. A three-ply head-rest (6 × 14 in.) is held firmly between the cushion and the back canvas.

The result may not be a work of art, but it is an extremely useful and adaptable chair. The designer aims to add arm-rests.

University of London

The title of professor emeritus of pathology in the university has been conferred on Prof. J. H. Dible on his retirement from the chair of pathology at the Postgraduate Medical School of London.

University of Leeds

Dr. Stephanie Leese has been appointed lecturer in child psychiatry. The title of reader in medicine has been conferred on Dr. Deryck Taverner, senior lecturer in medicine, and the title of reader in epidemiology on Dr. C. W. Dixon, senior lecturer and chief assistant in the department of preventive medicine and public health.

University of Edinburgh

On July 20 the following degrees and diplomas were conferred:

M.D.—D. I. McCallum, *A. F. Phillips, †T. G. Wilson.

Ph.D. in the faculty of Medicine.—‡Zakaria Ibrahim El-Darawy, Jean D. Garven, B. M. Hobson, ‡W.-N. S. Law, A. K. Lough, ‡L. W. Macpherson, Dababrata Raymahasaya, Lilly C. G. Thomson.

M.B., Ch.B.—P. J. Adams, Ademola Oyekanmi Aderemi, Frank Albert-Recht, D. P. Anderson, Elizabeth H. Angus, J. B. Arnot, D. M. Bachop, T. J. Bailey, Elsie T. Ballingall, C. A. Biagi, G. J. Biggam, J. W. Black, Diana R. E. Bridgford, C. J. Brigimen, J. D. Brown, T. R. Brown, Lorna M. Browne, T. A. S. Buist, Marjorie A. Cale, Aileen A. Calder, D. F. Cameron, Joan M. Cameron, Anne L. Campbell, Sheena W. Campbell, J. R. G. Carrie, L. E. S. Carrie, Bessie J. Catton, Kenneth Chapman, E. D. Colterjohn, Elizabeth M. Connell (with honours), W. C. Constable, Margaret H. Cooper, A. W. Craig, D. McI. Craigie, H. A. Crispin, I. H. Currie, G. M. Daniels, R. E. Dixon, Isabel E. Dobie, J. F. Donald, R. W. Douglas, Donald Dow, Derek Doyle, Christina F. J. Ducksbury, G. H. Ewing, J. S. Fleming, W. D. McE. Forbes, R. L. Frew, June Garden, P. J. Gillies, R. B. J. Goldie, A. M. Grier, T. O. Grundy, J. C. Guignard, Elizabeth L. Handasyde, R. A. Harkness, W. C. Hartley (with honours), E. W. Horton, E. C. A. Huckett, G. F. Hunter, N. W. Imlah, Alastair Jamieson, M. G. Kerr, J. F. Lamb, W. I. Lamont, J. A. Laurenson, J. R. Ledsome, D. I. MacG. Linklater, A. L. Linton, J. McK. Lonie, Elizabeth M. McM. Love, I. A. McClure, Rosemary McCredie, M. E. McCullough, D. W. Macdonald, A. W. McKenzie, H. M. Mackenzie, L. B. McKenzie, F. I. Macnaughton, J. T. A. Manley, Valerie J. Marrian, L. V. H. Martin, Beatrice Marwick, J. M. Melville, Mary S. Merrie, Ian Michie, J. A. Milligan, Elona I. Moir, S. T. Morton, J. S. Munro, C. D. Musk, D. O. Oliver, D. L. Owen, W. G. Paterson, P. N. Paterson-Brown, Margaret E. Paul, G. E. Paveley, George Philp, D. D. Pottinger, R. N. Reeve, Margaret A. Robb, Sheila J. B. Robertson, P. F. Roe, C. M. D. Ross, Audrey H. Rundle, S. R. Scott, Margaret H. Seath, Olumuyiwa Seriki, J. C. M. Sharp, G. J. M. Slawikowski, I. McD. Smith, T. H. M. Stewart, G. B. Sturrock, Ann M. H. Sutherland, G. R. Sutherland (with honours), I. A. G. Sutherland, Elizabeth A. Taylor, J. R. Taylor, H. S. Tinniswood, John Upton, Audrey P. Ward, D. M. Weir, R. F. Williams, J. McI. A. Willox, S. W. Willox, Elizabeth H. Wilson, Marjorie A. Wright, J. H. Yeoman.

D.P.H.—J. W. Bringan, Joan Campsie, L. J. Charles, Autar Singh Sethi, W. A. Simpson, J. D. Stewart, J. G. Thomson.

D.T.M. & H.—Maung Galay, H. A. S. Joseph, J. D. Macgregor, A. C. N. Millar, David Penman, Chitranjan Prasad, Uma Shankar Prasad Singh, Sebastian Zacharias.

*Awarded gold medal for thesis.
†Commended for thesis.
‡In absentia.

Institute of Research for the Prevention of Disease

On July 22 Lord Boyd-Orr, F.R.S., officially opened the new premises of this institute at 29, Upper Duke Street, Liverpool.

Royal College of Obstetricians and Gynæcologists

On July 22 Mr. Vincent Massey, P.C., C.H., and Dr. George Corner (Baltimore) were admitted to the honorary fellowship.

On July 23 a meeting of the council was held, with Sir Arthur Gemmell, the president, in the chair. Mr. Charles Read was elected president, and Prof. A. M. Claye and Mr. Victor Lack were elected vice-presidents.

The following officers were re-elected:

Hon. treasurer, Mr. A. C. H. Bell; hon. librarian, Mr. A. J. McNair; hon. secretary, Mr. I. MacG. Jackson; hon. curator of the museum, Mr. R. A. Brews; hon. treasurer, Australian regional council, Mr. John Chesterman; hon. treasurer New Zealand regional council, Mr. J. E. Giesen.

The following officer was elected:

Hon. treasurer, Canadian regional council, Mr. G. A. Simpson.

Professor Claye and Mr. C. H. G. Macafee were appointed Sims-Black professors for 1956.

The following were elected to the membership:

H. McK. G. Agnew, M. M. Baskin, Lokenath Bhose, M. L. Bloom, A. G. Bond, E. P. Campbell, Tuck Kwong Chong, Mary G. Coyle, J. W. G. Evans, R. W. Forman, Meenakshi Ghosh, J. A. Holmes, L. M. Jacks, J. D. C. Lyons, John MacVicar, Nirupama P. Nayak, Mary Phillips, Israel Rocker, J. P. Roux, A. H. Rowson, Samuel Sacks, J. R. Saunders, Muriel J. Soudamore, H. G. I. Shanks, C. D. Smith, R. McN. Thomson, R. F. Zacharin.

Medical Research Council

The council has made the following travelling awards for 1955–56:

Rockefeller Travelling Fellowships in Medicine

Dr. R. M. Acheson, medical registrar, Radcliffe Infirmary, Oxford.
Dr. G. L. Le Bouvier, assistant bacteriologist, Virus Reference Laboratory, Colindale, London.
Dr. A. W. M. Smith, medical registrar, Royal Infirmary, Edinburgh.
Dr. W. H. J. Summerskill, registrar and tutor, Postgraduate Medical School, London.
Dr. J. Vallance-Owen, senior medical registrar and medical tutor, Postgraduate Medical School, London.

Eli Lilly Travelling Fellowships in Medicine

Dr. J. C. Davis, lecturer in pathology, Liverpool University.
Dr. P. A. G. Munro, demonstrator in anatomy, University of Cambridge.
Dr. E. J. Ross, assistant, Medical Unit, University College Hospital Medical School, London.

Lederle Travelling Fellowship in Medicine

Dr. J. D. Judah, senior lecturer, Department of Morbid Anatomy, University College Hospital Medical School, London.

Alexander Pigott Wernher Memorial Travelling Fellowship in Otology

Dr. R. Hinchcliffe, officer-in-charge of the Royal Air Force acoustics laboratory.

French Exchange Scholarships in Medical Science
(In association with the Centre National de la Recherche Scientifique.)

Dr. I. M. Duguid, lecturer in anatomy, Aberdeen University.

British Hospitals Contributory Schemes Association (1948)

This association will hold its annual conference on Sept. 29 and 30 at Caxton Hall, London, S.W.1. Mr. Iain Macleod, the Minister of Health, will speak and Mr. L. Hart, secretary of the hospitals benefit fund of Western Australia, will give an address on the new Australian health service.

Biochemical Journal

Dr. A. Neuberger, F.R.S., is resigning from the chairmanship of the editorial board of this journal on Oct. 1. The committee of the Biochemical Society have appointed Mr. A. G. Ogston, D.PHIL., F.R.S., as his successor. The editorial office will be transferred from the National Institute of Medical Research at Mill Hill to the Lister Institute of Preventive Medicine, Chelsea Bridge Road, London, S.W.1. From Sept. 1, communications should be sent to F. Clark, Esq., M.A., B.SC., secretary to the editorial board of the journal, at that address.

CORRIGENDA: *Rheumatology.*—In our account (July 2, p. 34) of the European Rheumatology Congress, the prevalence of definite or probable rheumatic heart-disease in Rotterdam school-children, reported by Dr. P. van der Meer, should have been stated as 2·4 *per 1000*.

Meat Pies.—The sentence beginning in the 37th line of the second paragraph of this article last week (p. 191) should read: "380°F for forty minutes appears to be lethal to salmonella in a 4-oz. pie."

The order of the Brilliant Star of Zanzibar (third class) has been conferred on Mr. R. H. Purnell, F.R.C.S.E., specialist in the health department of Zanzibar, and the order (fourth class) on Dr. K. D. Young, formerly medical officer in the department.

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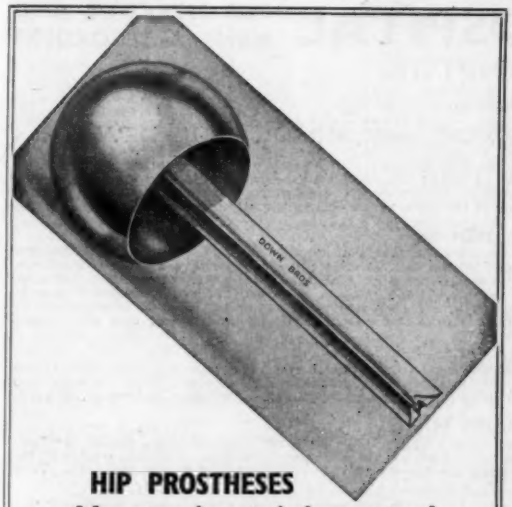

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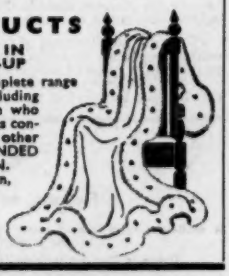

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Academic and Educational

ROYAL COLLEGE OF PHYSICIANS OF LONDON

The next EXAMINATION for the MEMBERSHIP will commence on MONDAY, 26TH SEPTEMBER, 1955.

Prospective candidates are asked to note that entries accompanied by the certificates, testimonials and the examination fee of 15 guineas as required by the by-laws, must reach the College not later than first post on Monday, 29th August, 1955. Candidates must have been qualified for 18 months.

Candidates who propose to submit published work under the regulations are required to give 28 days notice, and should apply in writing to the Registrar, without delay, for detailed instructions as to the procedure they should follow. Completed entries for published work must also reach the College not later than first post on Monday, 29th August, 1955.

HAROLD BOLDERO, D.M., Registrar.

12, Pall Mall East, London, S.W.1.

THE BERKELEY FELLOWSHIP

(Founded in memory of the late Sir G. H. A. COMYNS BERKELEY and his wife, ETHEL ROSE BERKELEY)

The Berkeley Fellowship was founded under the will of the late Sir G. H. A. Comyns Berkeley to provide research and travel facilities to a person elected jointly by the Master and Fellows of Gonville and Caius College, Cambridge, and the Council of The Middlesex Hospital Medical School. Under the terms of the bequest, medical centres in any part of the world may be visited, with the exception of Oxford or Cambridge.

Applications from graduates in medicine of The Middlesex Hospital Medical School are invited for the Fellowship. The period of tenure of the Fellowship and the emoluments will depend upon the circumstances of each case. A Fellowship will not normally be awarded for a period shorter than 3 months or longer than 1 year, but applications for renewal will be considered. The emolument may be paid as stipend or as grant to cover travel and other expenses necessarily incurred in the prosecution of the research, or partly as stipend and partly as grant. The total emolument allowed will not normally exceed £1500 during 1 years tenure.

Applications should reach the Dean of The Middlesex Hospital Medical School by 1st September, 1955, and should include the following information :—

(*a*) Name, address and age.
(*b*) Qualifications and experience.
(*c*) Present appointment.
(*d*) Programme of work proposed, with estimate of necessary expenses.
(*e*) Other sources of financial assistance, including any stipend from present appointment, if continued during the tenure of the Fellowship.

INSTITUTE OF OPHTHALMOLOGY (University of LONDON), Judd-street, London, W.C.1. Applications are invited for the post of Whole-time LECTURER IN BACTERIOLOGY. Duties will include routine bacteriological investigation and postgraduate teaching. The Lecturer will also have opportunities for research on the bacteriological aspects of ocular disease. The salary scale is £1000–£100–£1300 and family allowances are applicable. The successful candidate will be required to join the F.S.S.U.

Applications, with the names of 3 referees, must reach the undersigned by 26th August, 1955.

C. F. SEATH, Secretary.

Institute of Ophthalmology, Judd-street, W.C.1.

ST. VINCENT'S HOSPITAL CLINICAL SCHOOL, UNIVERSITY OF MELBOURNE. Applications are called for the position of the JOHN HOLT DIRECTOR OF BIOCHEMICAL RESEARCH in the St. Vincent's Hospital School of Medical Research. The successful applicant will be in full charge of the Biochemical Research work but would merely have supervisory control over the hospital's routine Biochemical Department. The research laboratories have been newly built and occupy approximately 4500 square feet. Adequate funds are available for equipment. Initially the department staff will comprise the Director, 2 Assistant Biochemists and 2 Technicians. The assistant staff will be appointed on the advice of the Director. Study leave will be granted after a period of 5 years service. A limited amount of money for the attendance at important scientific meetings will be available. Salary is £3000 a year Australian currency; superannuation according to F.S.S.U. Reasonable travelling expenses to Melbourne will be paid for successful applicant and family. Assistance will be given in finding suitable accommodation. Further details and plans of the laboratories may be seen at the office of the Secretary of the Association of the Universities of the British Commonwealth, Gordon-square, London, W.C.1, or at St. Vincent's Hospital.

Closing date for applications 20th August. Arrangements will be made to interview selected overseas applicants in London between 23rd and 30th August.

E. W. R. GRACE, Chief Executive Officer and Secretary.

UNIVERSITY OF LONDON INSTITUTES OF EDUCATION AND CHILD HEALTH. Applications are invited from registered medical practitioners for the post vacant on 1st December, 1955, of LECTURER IN CHILD HEALTH to carry out growth and development studies as Research Medical Officer at The Child Study Centre, Coram's-garden, London, W.C.1. Salary at scale £1000–£100–£1300, with superannuation and children's allowances.

Further details may be obtained from the Secretary, The Institute of Child Health, The Hospital for Sick Children, Great Ormond-street, London, W.C.1, to whom application should be sent, together with the names of 2 referees, not later than 1st October, 1955.

UNIVERSITY OF LONDON. Institute of Child Health. Applications are invited for the post of ASSISTANT to the Nuffield Professor of Child Health vacant on 1st December, 1955. The duties, which include teaching and research, will be divided between The Hospital for Sick Children, Great Ormond-street, and the Queen Elizabeth Hospital, Hackney-road, E.1. Applicants should have had experience in a Senior Registrar post. The appointment in the first instance is for 1 year renewable for further periods up to 3 years. Salary £1500 rising to £1700.

Applications, with the names of 2 referees, should be sent not later than 1st October, 1955, to the Secretary, The Institute of Child Health, The Hospital for Sick Children, Great Ormond-street, London, W.C.1.

THE UNIVERSITY OF LIVERPOOL. Applications are invited from University Graduates and holders of appropriate academic diplomas for the post of SUB-LIBRARIAN in the Faculties of Medicine and Veterinary Science. Initial salary in grade B of the Library scale (£650–£50–£950).

Applications should be received not later than 20th August, 1955, by the undersigned, from whom further particulars may be obtained. STANLEY DUMBELL, Registrar.

Hospital Services : Senior Appointments

NORTH WEST METROPOLITAN REGIONAL HOSPITAL BOARD.

(1) CONSULTANT GYNÆCOLOGIST (2 half-days a week). Mount Vernon Hospital, Northwood, Middlesex (551 Beds).

Applications by 5th September, 1955.

(2) CONSULTANT RADIOLOGIST (whole-time or maximum sessions), Hillingdon Hospital, Uxbridge, Middlesex (705 Beds) and associated hospitals.

Applications by 7th September, 1955.

Hospitals may be visited by direct appointment.

(3) OPHTHALMOLOGIST (Senior Hospital Medical Officer grade), Nottingdale School Treatment Centre, 1, Kenley-street, W.11. Duties involve 4 hours a week clinical time in 2 visits, Tuesday afternoons and Friday mornings.

Applications by 9th September, 1955.

Clinic may be visited by arrangement with the Divisional Medical Officer, 129, Fulham Palace-road, W.6.

Application forms obtainable from, and returnable to, Secretary, North West Metropolitan Regional Hospital Board, 11A, Portland-place, W.1.

ST. THOMAS'S HOSPITAL, London, S.E.1. Physician to the Department of Venereal Diseases. Consultant status, with membership of the Medical Committee, and responsibility for the Department. 5 sessions per week. Vacant April, 1956.

Applications (12 copies), naming 3 referees, to the Clerk of the Governors by 20th August.

ST. THOMAS'S HOSPITAL, London, S.E.1. Anæsthetist. Consultant status, with membership of the Medical Committee. 6 sessions per week. Vacant 1st November, 1955.

Applications (12 copies), naming 3 referees, to the Clerk of the Governors by 20th August.

THE HOSPITAL FOR SICK CHILDREN, Great Ormond-street, London, W.C.1. Applications are invited for the post of DEPUTY DIRECTOR to the Department of Diagnostic Radiology (Consultant status). Applicants must hold the Diploma in Medical Radiology and will be required to attend 6 sessions per week.

Further particulars and form of application, which must be returned not later than 22nd August, 1955, are obtainable from the undersigned.

H. F. RUTHERFORD, House Governor and Secretary.

LEEDS REGIONAL HOSPITAL BOARD.

Part-time CONSULTANT ANÆSTHETIST (8 sessions per week) for duties at hospitals in the Huddersfield area. The person appointed to reside in Huddersfield.

Part-time CONSULTANT OBSTETRICIAN AND GYNÆCOLOGIST (7 sessions per week) for duties at hospitals in the Bradford area (main unit St. Luke's Hospital, 113 obstetric and 111 gynæcological beds). The person appointed to reside in or near Bradford.

Whole-time ASSISTANT GERIATRICIANS (Senior Hospital Medical Officer scale) for duties at hospitals in the following areas :—

(1) Leeds A and B Groups (933 Beds).
(2) Bradford A and B Groups (728 Beds).

The successful candidates will work in collaboration with the Consultant Geriatricians, and will be required to reside in or near Leeds and Bradford respectively. In the case of both appointments there is an organised Area Geriatric Service.

Whole-time ASSISTANT RADIOLOGIST (Senior Hospital Medical Officer scale) for duties at hospitals in the Hull A, Hull B and East Riding Hospital Management Committee Groups. Applicants should have had wide experience in radiology, and the possession of the D.M.R. is essential. The successful candidate will work under the general guidance of the Consultant in charge of the Department, and will be required to reside in or near Hull.

Applications (12 copies), stating age, qualifications and details of present and previous appointments with dates, together with the names of 3 referees, to the Secretary, Park-parade, Harrogate, not later than 20th August, 1955.

LIVERPOOL REGIONAL HOSPITAL BOARD. Applications are invited for the post of Part-time CONSULTANT ORTHOPÆDIC SURGEON (6 notional half-days) with duties mainly at Whiston Hospital and also at Widnes and Rainhill Hospitals. Applicants must possess a higher qualification in Surgery.

Forms of application from, and to be returned to, Dr. T. Lloyd Hughes, Senior Administrative Medical Officer, Liverpool Regional Hospital Board, 19, James-street, Liverpool, 2, to be received not later than 20th August, 1955.

VINCENT COLLINGE, Secretary to the Board.

CARDIFF. UNITED CARDIFF HOSPITALS. The Board of Governors invites applications for the appointment of Whole-time CONSULTANT RADIOLOGIST. The appointment is primarily that of a Neuroradiologist but the applicant must have a wide knowledge of general radiology, to which half of his time will be given. The Department is a recognised school for the D.M.R.(D.) and for the M.S.R. and the successful candidate will be required to take part in the teaching.

Applications, with the names of 3 referees, should be sent to the Secretary, United Cardiff Hospital, Cardiff Royal Infirmary, Newport-road, Cardiff, within 14 days from the publication of this advertisement.

EAST ANGLIAN REGIONAL HOSPITAL BOARD. ASSISTANT RADIOLOGIST (whole-time) Norfolk and Norwich Hospital (441 Beds). The department is the centre for Consultant Radiological services to hospitals in Norwich, Cromer, Gt. Yarmouth and Norfolk. Wide experience and higher qualification necessary. Salary scale £1500–£1950.

Applications (8 copies), stating age, experience and names of 3 referees, to Secretary of Board, 117, Chesterton-road, Cambridge, by 8th August, 1955. Candidates invited to visit hospitals concerned by direct arrangement with Hospital Management Committee Secretary at the Hospital.

MANCHESTER REGIONAL HOSPITAL BOARD. CONSULTANT E.N.T. SURGEON to the Burnley and District Group of hospitals (Burnley General, Victoria and Reedyford Hospitals, &c.) whole-time or if maximum part-time, to devote substantially whole-time to appointment. Wide experience and higher qualifications essential; appointee to live in or near Burnley.

Application forms from the Senior Administrative Medical Officer to the Board, Cheetwood-road, Manchester, 8, to be returned by 9th August, 1955.

NEWCASTLE REGIONAL HOSPITAL BOARD. Cherry KNOWLE HOSPITAL, RYHOPE, SUNDERLAND. (850 Beds.) Locum Tenens PSYCHIATRIST (Senior Hospital Medical Officer) required for the above Hospital for 2–4 months. Single accommodation available. Salary 31½ guineas per week.

Applications, with names and addresses of 3 referees, to Regional Psychiatrist, "Blythswood South," Osborne-road, Newcastle upon Tyne, within 7 days.

OXFORD. THE UNITED OXFORD HOSPITALS. Applications are invited for the post of Part-time CONSULTANT AND RESEARCH NEUROLOGIST (3 sessions). The successful candidate will be expected to devote most of his time to clinical research, for which there are excellent facilities. He may hold a research grant in addition to his clinical appointment. He will be expected also to assist the Senior Consultants in the clinical work of the Department of Neurology, under the control of the Director of the Department, from whom further particulars can be obtained.

Applications, stating age, qualifications and experience, together with the names of 3 referees, should be addressed to The Administrator, The Radcliffe Infirmary, Oxford, to arrive not later than 6th August, 1955.

SHEFFIELD REGIONAL HOSPITAL BOARD. Whole-time CONSULTANT ANÆSTHETIST for the Sheffield No. 1 Hospital Management Committee Group with duties mainly at the City General Hospital, Sheffield. This hospital has teaching affiliations with the University of Sheffield. There are Professorial Medical and Gynecological Units, a Department of Thoracic Surgery and a Regional Cardiological Centre.

Further details and application forms from the Senior Administrative Medical Officer, Sheffield Regional Hospital Board, Old Fulwood-road, Sheffield. Forms to be returned by 20th August, 1955.

DUBLIN. NATIONAL MASS-RADIOGRAPHY ASSOCIATION LIMITED. Appointment of 2 ASSISTANT MEDICAL DIRECTORS.

Salary: £1200 p.a.

Essential qualifications: Candidates must be registered practitioners and possess the D.M.R. or the D.M.R.E.

Duties: To interpret 70-mm. miniature X-ray films.

The appointment will be whole-time and temporary. Selected candidates will be employed at the Association's headquarters in Dublin, and will be expected to take up duty on 1st September, 1955.

Further particulars and application forms may be obtained from the Secretary, National Mass-Radiography Association Limited, 37/39, Tara-street, Dublin.

CHRISTCHURCH, NEW ZEALAND. NORTH CANTERBURY HOSPITAL BOARD. RADIOLOGIST required. Applications, closing with the undersigned at 9 A.M. on Wednesday, 5th October, 1955, are invited from qualified medical practitioners possessing a recognised qualification in Diagnostic Radiology, and at least 2 years practical experience in this specialty, for duty at Christchurch Hospital, an acute general hospital of 567 established beds and an extensive X-ray Outpatient Service. The position is non-resident. Conditional upon a guarantee of at least 2 years service, a grant of up to £NZ120 will be made towards the cost of steamer fares actually incurred in travelling to New Zealand. In the case of a married man this concession will be extended to the appointee's wife and each dependent child. In addition an allowance will be paid to cover baggage and removal expenses to the embarkation port. The salary scale for the position will depend on the appointee's qualifications and experience but will be fixed between a minimum of £NZ1290 and a present maximum of £NZ1940 p.a. in addition to which a cost-of-living allowance of £81 p.a. will be paid. Schedule of information and conditions of appointment are obtainable on request from The New Zealand Government Office, 415, Strand, London.

Applications should be forwarded by air-mail and should contain full details of age, qualifications, positions held, and copies of 3 recent testimonials.

ALEX. PRENTICE, Secretary.

SOUTH WEST METROPOLITAN REGIONAL HOSPITAL BOARD requires Whole-time ASSISTANT RADIOTHERAPIST (Senior Hospital Medical Officer grade) for the Portsmouth and Chichester Radiotherapy Centres. Candidates should be in possession of the D.M.R.T. and have had wide experience in radiotherapy.

Applications (6 copies), stating age, qualifications, experience, and names and addresses of 3 referees, to the Area Secretary, Highcroft, Romsey-road, Winchester, by 19th August, 1955. Candidates may visit the Department at St. Mary's Hospital, Portsmouth, by arrangement with Mr. L. C. ROGERS, Acting Group Secretary, Portsmouth Hospital Management Committee, 35, Grove-road South, Southsea, Hants.

SOUTH WEST METROPOLITAN REGIONAL HOSPITAL BOARD urgently requires Whole-time or maximum Part-time Locum Tenens CONSULTANT or SENIOR HOSPITAL MEDICAL OFFICER RADIOTHERAPIST for the Portsmouth and Chichester Radiotherapy Centres for an indefinite period. Main duties will be at St. Mary's Hospital, Portsmouth. Salary in accordance with the terms and conditions of service of hospital medical and dental staffs.

Applications, giving names and addresses of 2 referees, to Area Secretary, South West Metropolitan Regional Hospital Board, Highcroft, Romsey-road, Winchester.

Hospital Services: Junior Appointments

ANNIE McCALL MATERNITY HOSPITAL, Jeffreys-road, S.W.4. Applications are invited from registered Women medical practitioners for the post of RESIDENT OBSTETRIC HOUSE SURGEON (post recognised for the D.Obst.R.C.O.G.). Appointment is for a period of 6 months, vacant now.

Applications, stating age, qualifications with dates, and nationality, accompanied by copies of 3 recent testimonials, should be sent to the Secretary, Lambeth Group Hospital Management Committee, Renfrew-road, S.E.11, not later than 6th August, 1955.

BOLINGBROKE HOSPITAL, Wandsworth Common, London, S.W.11. Locum SURGICAL REGISTRAR (resident), 7th August–2nd September, inclusive. F.R.C.S. essential.

Apply Hospital Secretary.

BROMPTON HOSPITAL, S.W.3. Applications are invited for the following posts:—

ASSISTANT RESIDENT MEDICAL OFFICER (Senior House Officer grade). Appointment is for 6 months from 1st October, 1955. Experience in artificial pneumothorax essential and in E.N.T. work desirable. Duties include work in tuberculosis dispensary and wards.

NON-RESIDENT HOUSE PHYSICIAN for which there are 3 vacancies, for 6 months from 1st October, 1955. Duties include work in Outpatient Department and wards. Salary at the rate of £525 p.a.

Applications, stating age, qualifications with dates, nationality and appointments held, together with copies of testimonials, by 6th August, to—

KENNETH A. F. MILES, House Governor.

CHILDREN'S HOSPITAL, Sydenham, S.E.26. House OFFICER (medicine and surgery) required 1st September, 1955. Post recognised for D.C.H.

Apply, naming 2 referees, to the Administrative Officer, by 4th August.

CONNAUGHT HOSPITAL, Walthamstow, E.17. (118 Beds.) Applications are invited for the post of CASUALTY OFFICER AND DEPUTY RESIDENT SURGICAL OFFICER, graded as Senior House Officer, vacant 25th August, 1955. Recognised for F.R.C.S. Salary £745 p.a., less £150 p.a. for board, lodging, &c.

Applications, with full details and copies of 2 recent testimonials, should be sent immediately to Secretary, Hospital Management Committee, Forest Group, Langthorne-road, E.11.

DREADNOUGHT SEAMEN'S HOSPITAL, Greenwich, S.E.10. HOUSE PHYSICIAN (pre-registration) required on 1st September.

Applications, stating age, nationality, qualifications and experience with 3 recent testimonials, should be sent to the undersigned on or before 13th August.

F. A. LYON, Secretary.

Dreadnought Seamen's Hospital, Greenwich, S.E.10.

HAMMERSMITH HOSPITAL AND POSTGRADUATE MEDICAL SCHOOL, Ducane-road, London, W.12. Whole-time NON-RESIDENT REGISTRAR required 1st September in the Hammersmith Chest Clinic, Hammersmith Hospital. Previous experience in chest clinic and/or sanatorium or chest hospital practice desirable.

Applications, stating age, qualifications, experience, names of 2 referees, to Secretary, Board of Governors, by 15th August.

HIGHLANDS GENERAL HOSPITAL, Winchmore Hill, N.21. (50 general medical beds, new Outpatient Department, Cardiological, Diabetic, Dermatological Departments.) NORTH WEST METROPOLITAN REGIONAL HOSPITAL BOARD. MEDICAL REGISTRAR required at above Hospital. Candidates may visit the Hospital by direct appointment.

Application forms obtainable from, and returnable to, the Secretary, Northern Group Hospital Management Committee, Royal Northern Hospital, N.7, by 13th August, 1955.

HOSPITALS FOR DISEASES OF THE CHEST. London CHEST HOSPITAL, E.2. Applications are invited for the post of REGISTRAR in Anæsthetics (recognised for F.F.A.R.C.S.). The post is a whole-time one, non-resident, and tenable in the first instance for 1 year from 1st October, 1955. Duties include attendance at the Country Branch, near Letchworth, Herts.

Applications, stating date of birth, qualifications with dates, previous appointments held, and accompanied by copies of 3 testimonials, should reach the undersigned by 20th August, 1955.

THOMAS BROWN, House Governor.

London Chest Hospital, E.2.

HACKNEY HOSPITAL, London, E.9. (General—844 Beds.) Applications for the 12 months resident appointment of CASUALTY OFFICER (Senior House Officer grade), from 1st September, should reach the Secretary, above address, by 12th August, quoting HH/SCO.

LONDON HOSPITAL, Whitechapel, E.1. Applications are invited for the post of REGISTRAR to Venereal Diseases Department Laboratory. Duties include work in the clinical laboratories of the Hospital.

Applications (12 copies), giving the names and addresses of 3 referees, should be received by the House Governor by 10th August, 1955. H. BRIERLEY, House Governor.

LONDON HOSPITAL, Whitechapel, E.1. Applications are invited for the post of SENIOR HOUSE OFFICER to the Venereal Diseases Department.

Applications (6 copies), together with 6 copies of 3 recent testimonials, should be received by the House Governor by 10th August, 1955. H. BRIERLEY, House Governor.

LONDON JEWISH HOSPITAL, Stepney Green, London, E.1. (130 Beds.) HOUSE PHYSICIAN (pre- or post-registration) required for 6 months commencing 3rd August, 1955.

Applications, with copies of testimonials, to be sent to the Hospital Secretary.

METROPOLITAN EAR, NOSE AND THROAT HOSPITAL at ST. MARY ABBOTS HOSPITAL, Marloes-road, Kensington, W.8. FULHAM AND KENSINGTON HOSPITAL MANAGEMENT COMMITTEE. SOUTH WEST METROPOLITAN REGIONAL HOSPITAL BOARD. Applications are invited for appointment at above Hospital as E.N.T. REGISTRAR, vacant 27th August. Candidates should have had considerable E.N.T. experience and possess the F.R.C.S. or the D.L.O. Candidates may visit the Hospital by arrangement.

Applications (5 copies to be completed) to be submitted by 12th August, 1955, on forms obtainable from the Group Secretary (136-L), 5, Collingham-gardens, London, S.W.5.

MILE END HOSPITAL, Bancroft-road, E.1. (475 Beds.) HOUSE SURGEONS (pre- or post-registration) :—

(i) Post vacant immediately.
(ii) Post vacant 25th August, 1955.

Application forms obtainable from Physician-Superintendent, to be returned by 5th August, 1955, with copies of not more than 3 testimonials.

MOTHERS' HOSPITAL (Salvation Army), London, E.5. (Maternity—110 Beds.) OBSTETRIC HOUSE SURGEONS required as under :—

(*a*) from 1st September (pre-registration).
(*b*) from 1st September (registered).

The 6-month appointments are recognised for the M.R.C.O.G.

Apply Group Secretary, Hackney Hospital, London, E.9, quoting MH/HO.

NATIONAL HOSPITALS FOR NERVOUS DISEASES. Applications are invited from registered medical practitioners for the appointment of REGISTRAR (whole-time) to the Department of Clinical Pathology at The National Hospital, Queen-square, W.C.1. This post carries the grade of Registrar. The appointment will be for 1 year in the first instance.

Applications, with names of 2 referees, to be sent to the undersigned not later than 27th August, 1955.

H. EWART MITCHELL, Secretary to the Board of Governors.
The National Hospital, Queen-square, W.C.1.

NATIONAL HOSPITALS FOR NERVOUS DISEASES. Applications are invited from registered medical practitioners for the appointment of HOUSE PHYSICIAN at The National Hospital, Queen-square, W.C.1. This post carries the grade of Registrar. The appointment will be for 1 year and will be renewed in exceptional circumstances.

Applications, with names of 3 referees, to be sent to the undersigned not later than 20th August, 1955.

H. EWART MITCHELL, Secretary to the Board of Governors.
The National Hospital, Queen-square, W.C.1.

NORTH MIDDLESEX HOSPITAL, Edmonton, N.18. CASUALTY OFFICER (Senior House Officer grade). Post recognised for F.R.C.S. 6 months appointment starting 12th September. Non-resident.

Applications, stating age, nationality, qualifications, experience, with copies of recent testimonials and/or names of 2 referees, to Secretary of Hospital, by 8th August.

NORTH MIDDLESEX HOSPITAL, Edmonton, N.18. RESIDENT HOUSE ANÆSTHETIST (House Officer), required for 15th September. 6 months appointment. Post recognised for D.A. and F.F.A.R.C.S. Whole-time duties under supervision of Senior Anæsthetists.

Applications, stating age, nationality, qualifications, experience, with copies of recent testimonials, to Secretary of Hospital, by 10th August.

NORTH WEST METROPOLITAN REGIONAL HOSPITAL BOARD. REGISTRAR required in X-ray Department, Central Middlesex Hospital, Park Royal, N.W.10. Whole-time, non-resident. Will include teaching. Possession of Diploma in Radiology desirable. Hospital may be visited by direct appointment.

Application forms from, and returnable to, Group Secretary, Central Middlesex Group Hospital Management Committee, Park Royal, N.W.10, by 9th August, 1955.

PRINCE OF WALES'S GENERAL HOSPITAL, N.15. (219 Beds.) Applications are invited from registered medical practitioners for the post of SENIOR HOUSE OFFICER RESIDENT HOUSE SURGEON to Orthopædic, Fracture, and Traumatic Department, E.N.T. Department, and SENIOR CASUALTY OFFICER, for a period of 6 months, vacant 24th August, 1955.

Application form from Secretary, Tottenham Group Hospital Management Committee, The Green, N.18, to be returned by 13th August, 1955.

QUEEN ELIZABETH HOSPITAL FOR CHILDREN MANAGEMENT COMMITTEE, Hackney-road, E.2, Shadwell, E.1, and BANSTEAD WOOD, SURREY. Applications are invited for the appointment of RESIDENT MEDICAL OFFICER (Male or Female), graded Senior House Officer, at Shadwell, E.1, to become vacant 1st September, 1955. Candidates must have had experience in the treatment of sick children. The appointment will be for 1 year.

Application forms may be obtained from the Secretary at Hackney-road, and should be returned, with copies of not more than 3 testimonials, not later than 12th August, 1955.

ROYAL NATIONAL ORTHOPÆDIC HOSPITAL, 234, Great Portland-street, London, W.1. Applications are invited for the appointment of ORTHOPÆDIC REGISTRAR (full-time), non-resident. Preference will be given to candidates with a higher surgical qualification. Duties to commence 1st November.

Applications to be received not later than 14th August. Forms of application can be obtained from the House Governor at 234, Great Portland-street, London, W.1.

ROYAL NATIONAL THROAT, NOSE AND EAR HOSPITAL. Gray's Inn-road, W.C.1, and Golden-square, W.1. RESIDENT HOUSE SURGEON (post-registration post). Applications are invited for a 6 months appointment as from 1st September, 1955, with salary and conditions as laid down for House Officers in the terms and conditions of service in the National Health Service.

Applications, stating age, qualifications, full details of previous experience (particularly in this specialty), with copies of 1–3 recent testimonials, should be sent to the House Governor immediately.

ROYAL NORTHERN HOSPITAL, Holloway, London, N.7. (279 Beds.) NORTH WEST METROPOLITAN REGIONAL HOSPITAL BOARD. REGISTRAR required in the Orthopædic and Fracture Department of the above Hospital. Candidates may visit the Hospital by direct appointment.

Application forms obtainable from, and returnable to, the Secretary, Royal Northern Hospital, N.7, by 9th August, 1955.

ROYAL NORTHERN HOSPITAL, Holloway, London, N.7. Applications are invited for the post of SENIOR HOUSE OFFICER (orthopædics), vacant mid-October, 1955. Occasional casualty duties. Recognised for F.R.C.S.

Applications to be sent to the Hospital Secretary by 6th August, 1955.

SOUTH EAST METROPOLITAN REGIONAL HOSPITAL BOARD. Applications are invited for an appointment as REGISTRAR in Orthopædic Surgery at the Lewisham Group of hospitals, for duties mainly at Lewisham Hospital, London, S.E.13. The appointment, which may be either resident or non-resident, will be for 1 year in the first instance and is recognised for F.R.C.S. The medical establishment of the department comprises 2 Registrars and a Senior House Officer under the direction of 2 Consultants : the Casualty Department is separately staffed.

Applications, giving particulars of age, qualifications and experience with relevant dates, together with the names and addresses of 2 referees, to be sent to the Secretary, Registrars Committee, South East Metropolitan Regional Hospital Board, 11, Portland-place, London, W.1, not later than 13th August, 1955.

ST. BARTHOLOMEW'S HOSPITAL, E.C.1, AND THE NORTH EAST METROPOLITAN REGIONAL HOSPITAL BOARD. Applications are invited for the post of SENIOR REGISTRAR in General Medicine to be held for 2 years at St. Bartholomew's Hospital, for 1 year at the Southend General Hospital or the Essex County Hospital and for 1 year in a special unit and/or on research work. The post is subject to annual re-election and is tenable on 1st October, 1955.

Applications, with the names of 3 referees, should be submitted to the undersigned within 10 days of the appearance of this advertisement.

C. C. CARUS-WILSON, Clerk to the Governors.
St. Bartholomew's Hospital, E.C.1.

ST. BARTHOLOMEW'S HOSPITAL, E.C.1, AND THE NORTH EAST METROPOLITAN REGIONAL HOSPITAL BOARD. Applications are invited for the post of SENIOR REGISTRAR in General Surgery to be held for 2 years at St. Bartholomew's Hospital and for 2 years at a Regional Hospital, subject to annual re-election. The post is tenable from 1st October, 1955.

Applications, with the names of 3 referees, should be submitted to the undersigned within the next 10 days.

C. C. CARUS-WILSON, Clerk to the Governors.
St. Bartholomew's Hospital, E.C.1.

ST. JOHN'S HOSPITAL FOR DISEASES OF THE SKIN, Lisle-street, Leicester-square, London, W.C.2. Applications are invited for the appointment of Whole-time REGISTRAR. Possession of a higher qualification desirable.

Applications, stating age, qualifications and experience, with names of 3 referees, to the Secretary by 19th August, 1955.

ST. PETER'S, ST. PAUL'S AND ST. PHILIP'S HOSPITALS. Required, REGISTRAR in Anæsthetics. Non-resident appointment on an annual basis.

Applications (7 copies), and names and addresses of 2 referees, to the House Governor, St. Peter's Hospital, Henrietta-street, London, W.C.2. Closing date 27th August, 1955.

ST. STEPHEN'S HOSPITAL, Fulham-road, S.W.10. OBSTETRICAL AND GYNÆCOLOGICAL HOUSE SURGEON (resident), post-registration. Post recognised for D.Obst. R.C.O.G.

Applications, naming 2 referees, to Medical Superintendent.

ST. THOMAS'S HOSPITAL, London, S.E.1. Clinical CHIEF ASSISTANT to the Radioactive Isotope Unit for an initial period of 2 years. Graded Senior Registrar (supernumerary).

Applications, naming 2 referees, to the Clerk of the Governors by 12th August, 1955.

ST. ALFEGE'S HOSPITAL, S.E.10. (373 Beds. Recognised for F.R.C.S. examination.) RESIDENT SENIOR HOUSE OFFICER (orthopædics and general surgery), vacant approximately mid-August. 6 months appointment (renewable).

Applications and testimonials to Secretary, Greenwich and Deptford Hospital Management Committee, St. Alfege's Hospital, S.E.10.

ST. GEORGE-IN-THE-EAST HOSPITAL, Raine-street, Wapping, E.1. Applications are invited for the post of CASUALTY OFFICER (Senior House Officer), resident or non-resident. (9 A.M.–5 P.M. Monday–Friday : 9 A.M.–1 P.M. Saturday). Tenable for 1 year. Salary, &c., in accordance with national scale

Application forms obtainable from, and returnable to, the Medical Superintendent.

ST. JAMES' HOSPITAL, Balham, S.W.12. Wandsworth HOSPITAL GROUP. SOUTH WEST METROPOLITAN REGIONAL HOSPITAL BOARD. ANÆSTHETIC REGISTRAR. Hospital recognised for D.A. and F.F.A.R.C.S.

Application forms (send stamped addressed foolscap envelope) obtainable from Group Secretary at above address, to be completed and returned by 12th August.

THE HOSPITAL FOR SICK CHILDREN, Great Ormond-street, London, W.C.1. There will be a vacancy on 19th October, 1955, for a RESIDENT ANÆSTHETIST (Registrar grade) for duty primarily at the Country Branch Hospital, Tadworth, Surrey.

Full particulars and form of application, which must be returned not later than 22nd August, 1955, are obtainable from the undersigned.

H. F. RUTHERFORD, House Governor and Secretary.

THE HOSPITAL FOR SICK CHILDREN, Great Ormond-street, London. W.C.1. There will be a vacancy in October, 1955, for a RESIDENT DENTAL HOUSE SURGEON (Senior House Officer). The post is recognised for the Fellowship in Dental Surgery, Royal College of Surgeons. Experience is given in both oral surgery and orthodontics.

Further particulars and form of application which must be returned not later than 5th September, 1955, are obtainable from the undersigned.

H. F. RUTHERFORD, House Governor and Secretary.

THE HOSPITAL FOR SICK CHILDREN, Great Ormond-street, London, W.C.1. There will be vacancies for the following Senior House Officers :—

1 HOUSE PHYSICIAN on 15th November, 1955.
1 HOUSE SURGEON to the Orthopædic and Plastics Departments on 15th November, 1955.

Further particulars and form of application, which must be returned not later than 5th September, 1955, are obtainable from the undersigned.

H. F. RUTHERFORD, House Governor and Secretary.

THORPE COOMBE MATERNITY HOSPITAL, Walthamstow, E.17. (58 Beds.) Applications are invited from medical Women for the post of JUNIOR OBSTETRIC OFFICER (graded House Officer), vacant 31st August, 1955. The Hospital is recognised by the Royal College of Obstetricians and Gynæcologists.

Applications, with full details and copies of 2 recent testimonials, should be sent immediately to Secretary, Hospital Management Committee, Forest Group, Langthorne-road, E.11.

WANSTEAD HOSPITAL, Harmon Hill, London, E.11. (191 Beds.) HOUSE SURGEON required. Post vacant now. Recognised for F.R.C.S.

Applications, with full details and copies of 2 recent testimonials, should be sent immediately to Secretary, Forest Group Hospital Management Committee, Langthorne-road, E.11.

WANSTEAD HOSPITAL, Harmon Hill, E.11. (191 Beds.) Applications are invited for the post of CASUALTY OFFICER, recognised for F.R.C.S. Graded Senior House Officer. Salary £745 p.a., less £150 p.a. for board, lodging, &c.

Applications, with full details and copies of 2 recent testimonials, should be sent immediately to the Secretary, Forest Group Hospital Management Committee, Langthorne-road, E.11.

WANSTEAD HOSPITAL, Harmon Hill, E.11. (191 Beds.) Applications are invited for the post of OBSTETRIC AND GYNÆCOLOGICAL HOUSE SURGEON, vacant 26th August, 1955. The appointment is recognised for the D.Obst.R.C.O.G.

Applications, with full details and copies of 2 recent testimonials, should be sent immediately to the Secretary, Forest Group Hospital Management Committee, Langthorne-road, E.11.

WHITTINGTON HOSPITAL, Highgate Hill, N.19. Senior HOUSE OFFICER (resident) required for E.N.T. Department. Post recognised for D.L.O. Vacant 1st September, 1955.

Detailed applications, with copies of 2 recent testimonials and the name of 1 referee, to Medical Superintendent by 8th August.

ABERYSTWYTH GENERAL HOSPITAL. Mid Wales HOSPITAL MANAGEMENT COMMITTEE. Applications are invited for the post of SENIOR HOUSE OFFICER at the above Hospital. Post recognised for F.R.C.S. Vacant on 1st August, 1955. The post is resident.

Applications, stating age, nationality, qualifications, and experience, accompanied by copies of 2 recent testimonials, should be sent to the Group Secretary, "Orlandon," Northparade, Aberystwyth, within 14 days from the publication of this advertisement.

ASHFORD HOSPITAL, Ashford, Middlesex. Staines GROUP HOSPITAL MANAGEMENT COMMITTEE. Required, 2 RESIDENT HOUSE SURGEONS (Male) for general surgical duties. 6 months appointments :—

(1) Vacant on 1st September.
(2) Vacant on 8th September.

Preference given to pre-registration candidates.

Applications, stating age, qualifications and experience, with copies of up to 3 recent testimonials, to Medical Director of Hospital.

ASCOT. HEATHERWOOD ORTHOPÆDIC HOSPITAL. (212 Beds.) Locum ORTHOPÆDIC REGISTRAR required immediately.

Applications, giving full details, to Hospital Secretary.

AYLESBURY, BUCKINGHAMSHIRE. STOKE MANDE-VILLE HOSPITAL. Applications are invited for the post of Locum Tenens HOUSE PHYSICIAN (Senior Resident Medical Officer), Senior House Officer grade for the Acute General Medical Unit for the period 6th–20th August, 1955.

Applications, with copies of 2 testimonials, to the Administrative Officer.

BANGOR. ST. DAVID'S HOSPITAL. (Specialist Hos-pital for Women and Children.) CAERNARVON AND ANGLESEY HOSPITAL MANAGEMENT COMMITTEE. Applications are invited for the post of RESIDENT PÆDIATRIC OFFICER (Senior House Officer grade). Preference will be given to candidates with previous experience in neonatal and premature infant care. The Pædiatric Unit is recognised for the D.C.H. Salary according to scale.

Applications, stating age, qualifications and experience, together with the names and addresses of 2 referees, should be forwarded within 10 days of the appearance of this advertisement to the Group Secretary, Plas Gwyn, Ffriddoedd-road, Bangor, North Wales.

BARNSLEY. BECKETT HOSPITAL. Applications are invited for the post of HOUSE SURGEON (pre-registration post) now vacant. National Health Service terms and conditions of service.

Applications to be sent to Group Secretary, Barnsley Hospital Management Committee, 33, Gawber-road, Barnsley.

BARNSTAPLE. NORTH DEVON INFIRMARY. (110 Beds.) HOUSE SURGEON (pre-registration). Post now vacant.

Applications to Group Secretary, North Devon Hospital Management Committee, 19, Alexandra-road, Barnstaple.

BATH HOSPITAL MANAGEMENT COMMITTEE. Applications are invited from medical practitioners for the post of HOUSE SURGEON (gynæcology and obstetrics) to the Bath Group of hospitals, vacant early September. The post is recognised for pre-registration purposes and for the Diploma of the Royal College of Obstetricians and Gynæcologists.

Applications, stating age, qualifications and experience with 3 testimonials, should be forwarded to Group Secretary, Manor Hospital, Combe Park, Bath, by 6th August, 1955.

BEDFORD GENERAL HOSPITAL. (437 Beds.) Locum ORTHOPÆDIC REGISTRAR required 3rd–30th August. Salary £17 10s. per week.

Applications, stating age, nationality, qualifications, and previous appointments, together with copies of 2 recent testimonials, should be forwarded to Group Secretary, Bedford Group Hospital Management Committee, 3, Kimbolton-road, Bedford.

BISHOP'S STORTFORD AND DISTRICT HOSPITAL, Rye-street, BISHOP'S STORTFORD, HERTS. (67 Beds—medical, surgical and maternity. Midway between London and Cambridge. Main Line Railway from Liverpool Street. Applications are invited from registered medical practitioners for the appointment of RESIDENT SENIOR HOUSE OFFICER. Appointment to commence as soon as possible. Salary £745 p.a.

Applications, stating age, nationality, qualifications and experience, with copies of recent testimonials or names of referees, should be sent to the Hospital Secretary, Haymeads Hospital, Bishop's Stortford, Herts.

BIRMINGHAM. ACCIDENT HOSPITAL, Bath-row, BIRMINGHAM, 15. RESIDENT ANÆSTHETIST (Senior House Officer). There are 3 Consultant Anæsthetists and training is given in modern methods of anæsthesia. Ample opportunity for study. Previous experience not essential.

Applications, with full details naming 2 referees, to Administrator.

BIRMINGHAM AND MIDLAND EAR AND THROAT HOSPITAL, Edmund-street, BIRMINGHAM, 3. HOUSE OFFICER required. Pre-registration considered.

Detailed applications, with copies of 2 recent testimonials, to Secretary, Dudley Road Hospital, Birmingham, 18.

BIRMINGHAM REGIONAL HOSPITAL BOARD.

(1) **Birmingham (Selly Oak) Group, Oak Tree-lane, Birmingham, 29**

REGISTRAR—Chief Assistant to Clinical Director, for Birmingham Accident Hospital (215 Beds). General surgical experience and F.R.C.S. essential, orthopædic experience desirable. Over 52,000 acute accidents admitted annually. Post offers surgical experience and training exclusively in general accident surgery.

(2) **South Warwickshire Group, 50, Holly-walk, Leamington Spa**

REGISTRAR in General Surgery. Duties mainly at Stratford-on-Avon Hospital (187 Beds). Experience specialty desirable.

(3) **Stafford Group, 13, Foregate-street, Stafford**

REGISTRAR in Medicine. Duties mainly at Staffordshire General Infirmary (175 Beds). Experience specialty and higher qualification desirable.

Application forms from Group Secretaries, to be returned before 15th August, 1955. Candidates may visit hospitals.

BIRMINGHAM. THE UNITED BIRMINGHAM HOS-PITALS. QUEEN ELIZABETH HOSPITAL. Applications are invited for the post of MEDICAL REGISTRAR (Registrar or Senior House Officer grade) for duty in the Medical Professorial Unit. For appointment to Registrar grade candidates should have the M.R.C.P. (London). Opportunities exist for participation in cardio-respiratory research. The successful candidate may be required to be resident.

Forms of application may be obtained from, and should be returned not later than 20th August, 1955, to, the Secretary, The United Birmingham Hospitals, Queen Elizabeth Hospital, Birmingham, 15.

BIRMINGHAM. THE UNITED BIRMINGHAM HOSPITALS. QUEEN ELIZABETH HOSPITAL. Applications are invited for the post of MEDICAL REGISTRAR (Senior Registrar grade) for duty in the Medical Professorial Unit. The appointment is subject to annual review and the successful candidate may subsequently be required to spend not more than 2 years in a selected hospital of the Birmingham Regional Hospital Board, in accordance with the arrangements for the interchange of Registrars agreed between the 2 Boards. Opportunities exist for participation in cardio-respiratory research. The successful candidate may be required to be resident.

Forms of application may be obtained from, and should be returned not later than 20th August, 1955, to, the Secretary, United Birmingham Hospitals, Queen Elizabeth Hospital, Edgbaston, Birmingham, 15.

BIRMINGHAM, 9. YARDLEY GREEN HOSPITAL. THORACIC SURGICAL UNIT. (66 Beds.) Vacancies exist for 2 SENIOR HOUSE OFFICERS. No previous experience in thoracic surgery necessary.

Applications, stating age, qualifications, training and experience, together with names of 3 referees, should be addressed to the Group Secretary, Yardley Green Hospital, Birmingham, 9.

BLACKBURN AND DISTRICT HOSPITAL MANAGEMENT COMMITTEE. SENIOR HOUSE OFFICER (pathology) required. Duties at Royal Infirmary, Blackburn (Group Laboratory), but may also be required for duties at Queen's Park, Hospital, Blackburn, and Victoria Hospital, Accrington, at Consultant's discretion. Recognised for D.Path. Accommodation for married man and small family may be available at Queen's Park Hospital, if required.

Applications, with names of 2 referees, to Group Secretary, Hospital Management Committee Office, Royal Infirmary, Blackburn.

BLACKBURN AND DISTRICT HOSPITAL MANAGEMENT COMMITTEE. JUNIOR HOSPITAL MEDICAL OFFICER required for new Geriatric Department, under control of Consultant Geriatrician. There are 360 geriatric beds at Queen's Park Hospital, Blackburn, Springfield Annexe to Royal Infirmary, Blackburn, and Clitheroe Hospital, Clitheroe. Accommodation for married man and small family may be available if required.

Applications, with names of 2 referees, to Group Secretary, Hospital Management Committee Office, Royal Infirmary, Blackburn.

BLACKBURN. ROYAL INFIRMARY. (262 acute beds.) BLACKBURN AND DISTRICT HOSPITAL MANAGEMENT COMMITTEE. SENIOR HOUSE OFFICER (general surgery) required end of August at the above Infirmary. Recognised for F.R.C.S.

Apply to Secretary, Hospital Management Committee Office, Royal Infirmary, Blackburn.

BRADFORD. ST. LUKE'S HOSPITAL. House Surgeon (general) required, vacant 12th August. Recognised for pre-registration purposes and F.R.C.S. Salary £425–£525 p.a., less £125 p.a. residential emoluments.

Applications, stating age, nationality, qualifications, and experience with copy testimonials, to Secretary, Royal Infirmary, Bradford.

BRADFORD. ST. LUKE'S HOSPITAL. Senior House OFFICER (anæsthetics), vacant 8th August. Salary £745 p.a., less £150 p.a. residential emoluments. Opportunities for plastic and intra-thoracic experience and recognised for D.A. and F.F.A.R.C.S.

Applications, stating age, nationality, qualifications, and experience, with copy testimonials, to Secretary, Bradford Royal Infirmary.

BRADFORD. ST. LUKE'S HOSPITAL AND WOODLANDS HOSPITAL, RAWDON, near LEEDS. SENIOR HOUSE OFFICER to Orthopædic Unit, with duties at both hospitals, vacant now. Salary £745 p.a., less £150 p.a. residential emoluments.

Applications, stating age, nationality, qualifications and experience with copy testimonials, to the Secretary, Bradford Royal Infirmary.

BRISTOL-COSSHAM/FRENCHAY HOSPITAL MANAGEMENT COMMITTEE. FRENCHAY HOSPITAL. (513 staffed beds, expanding.) Applications are invited for the post of SENIOR HOUSE OFFICER in the regional Neurosurgery Department. This post offers useful surgical experience and the opportunity of gaining a working knowledge of neurological diagnosis. Recognised for F.R.C.S.

Applications to the Secretary, Frenchay Hospital, quoting "N.S.F." Names of 2 referees required.

BROMSGROVE GENERAL HOSPITAL. (423 Beds.) Locum HOUSE OBSTETRICIAN AND GYNÆCOLOGIST (pre-registration) required at the above Hospital, at present 33 maternity, 14 gynæcological beds. Post vacant in August.

Applications, with the names of 3 referees, to the Hospital Secretary.

BROMSGROVE GENERAL HOSPITAL. (423 Beds.) HOUSE OBSTETRICIAN AND GYNÆCOLOGIST (pre-registration) required at the above Hospital, at present 33 maternity, 14 gynæcological beds.

Applications, with the names of 3 referees, to Hospital Secretary.

BROXBURN, WEST LOTHIAN. BANGOUR GENERAL HOSPITAL. EAR, NOSE AND THROAT UNIT. Applications are invited for the post of REGISTRAR in the E.N.T. Unit at Bangour General Hospital, Broxburn, which is 15 miles from Edinburgh, which carries certain minimal duties at the Royal Infirmary, Edinburgh. The Unit comprises 30 Beds and also undertakes oral dental surgery. Salary and conditions of service will be in accordance with the regulations.

Applications, giving age, qualifications, and particulars of previous experience, should be lodged with the Group Medical Superintendent, Bangour General Hospital, Broxburn, West Lothian.

BROXBURN, WEST LOTHIAN. BANGOUR GENERAL HOSPITAL. CHEST AND TUBERCULOSIS UNIT. Applications are invited for the appointment of HOUSE OFFICERS in the Chest and Tuberculosis Unit at Bangour General Hospital, Broxburn (650 Beds), which is 15 miles west of Edinburgh. This Unit (300 Beds) offers comprehensive experience in latest methods of treatment of tuberculosis. Thoracic, orthopædic and genito-urinary surgery are done within the Unit which is also the centre of area domiciliary and outpatient work.

Applications, giving age, qualifications and particulars of previous experience, to the Group Medical Superintendent, Bangour General Hospital, Broxburn, West Lothian.

BURY AND ROSSENDALE HOSPITAL MANAGEMENT COMMITTEE. BURY GENERAL HOSPITAL. CLINICAL PATHOLOGIST (Senior House Officer grade), resident or non-resident, with duties mainly at Bury General Hospital. The post affords opportunities for gaining experience in all branches of pathology.

Apply, stating nationality, qualifications, &c., and names of 2 referees, to H. WILKINSON, Esq., Group Secretary.

Bury General Hospital, Bury, Lancs.

CAMBRIDGE. ADDENBROOKE'S HOSPITAL. Casualty OFFICER (Senior House Officer grade) required at above Hospital from 19th September, non-resident if desired.

Apply, with full particulars and copies of 3 recent testimonials, to the Secretary by 13th August. Interviews mid-August.

CAMBRIDGE. ADDENBROOKE'S HOSPITAL. Medical REGISTRAR, vacant 1st October for 1 year in the first instance, reviewable annually.

Apply, with full particulars and names of 3 referees, to Secretary by 13th August.

CAMBRIDGE. ADDENBROOKE'S HOSPITAL. Gynæcological HOUSE SURGEON for 6 months from 1st October, 1955. Second or subsequent post. Recognised for Pre-registration Service and M.R.C.O.G.

Apply, stating age, nationality, qualifications and experience with dates, and copies of 3 testimonials, to Secretary by 13th August. Interviews 20th August.

CAMBRIDGE. MATERNITY HOSPITAL. Resident OBSTETRICAL OFFICER (second or subsequent post) for 6 months from 1st October. Recognised Pre-registration Service. Recognised for M.R.C.O.G. and D.Obst.R.C.O.G. examinations.

Apply, stating age, nationality, qualifications and experience with dates, and copies of 3 testimonials, to Secretary, United Cambridge Hospitals, Addenbrooke's Hospital, by 13th August. Interviews 20th August.

CANTERBURY. KENT AND CANTERBURY HOSPITAL. (276 Beds.) GYNÆCOLOGICAL HOUSE SURGEON required at Highland Court Annexe, a unit of 25 gynæcological beds situated 3 miles from the above Hospital, with all ancillary services available. Recognised for M.R.C.O.G. 6 months appointment. Post now vacant. National Health Service salary and conditions.

Applications, together with copies of 2 recent testimonials, to be addressed to the Hospital Secretary at the above Hospital.

CARDIFF. ROYAL HAMADRYAD GENERAL AND SEAMEN'S HOSPITAL. CARDIFF HOSPITAL MANAGEMENT COMMITTEE. SENIOR HOUSE OFFICER (resident) required at above Hospital which caters for acute general medical and surgical cases. There are Genito-urinary Unit for inpatients and outpatients, general Outpatient Department and Casualty Department. Consultant staff of 8 drawn from United Cardiff Hospitals. Facilities exist for postgraduate study.

Application form immediately from Group Secretary, Cardiff Hospital Management Committee, 44, Cathedral-road, Cardiff.

CARDIFF. THE UNITED CARDIFF HOSPITALS. (Associated with the Welsh National School of Medicine.) Applications are invited for the post of REGISTRAR to the Department of Anæsthetics of the United Cardiff Hospitals. The successful candidate may be required to assist with teaching and research.

Application forms, which should be returned within 14 days, can be obtained from the Secretary, United Cardiff Hospitals, Cardiff Royal Infirmary.

CARSHALTON. QUEEN MARY'S HOSPITAL FOR CHILDREN. (A general Children's Hospital of 818 Beds.) HOUSE SURGEON (resident) required for 6 months. Applicants must have completed 12 months Pre-registration Service. Post vacant.

Applications, stating age, qualifications and experience, together with 3 recent testimonials, should be submitted to the Group Secretary by 11th August, 1955.

CHELMSFORD HOSPITAL MANAGEMENT COMMITTEE. Resident Locum Tenens REGISTRAR to the Department of Pathology in Chelmsford from the middle of August. Previous experience in pathology essential. Higher qualifications not necessary.

Apply Secretary, Chelmsford Hospital Management Committee, London-road, Chelmsford.

CHELTENHAM MATERNITY HOSPITAL. Cheltenham GROUP HOSPITAL MANAGEMENT COMMITTEE. Applications are invited from registered medical practitioners for the appointment of RESIDENT OBSTETRIC OFFICER. The Hospital which is recognised for the purpose of training for the D.Obst.R.C.O.G., has 50 beds and deals with the majority of abnormal midwifery cases in North Gloucestershire. The appointment is for a period of 6 months and the salary will be £425, £475, or £525 p.a., less £125 in respect of residential emoluments. The appointment will be vacant about the middle of July, 1955.

Applications, stating age, qualifications and experience, and accompanied by copies of 3 recent testimonials, should be sent to the Secretary, Cheltenham Group Hospital Management Committee, General Hospital, Cheltenham.

CHELTENHAM GROUP HOSPITAL MANAGEMENT COMMITTEE. Applications are invited from Male and Female practitioners for the appointment of SENIOR HOUSE OFFICER ANÆSTHETIST which will be vacant at the beginning of September. Salary and conditions of service in accordance with Whitley Council regulations.

Applications, with names of referees and full details, to—
STANLEY T. DAVIS, Group Secretary.
General Hospital, Cheltenham.

CHEPSTOW, MONMOUTHSHIRE. PLASTIC SURGERY, JAW INJURIES AND BURNS CENTRE, ST. LAWRENCE HOSPITAL. (100 plastic surgery, 50 orthopædic beds.) 2 SENIOR HOUSE OFFICERS in Plastic Surgery required, 1 in early August, and the other on 1st September. Previous experience in specialty not essential. The successful candidates will receive a thorough training in plastic surgery and burns. Hospital intakes from most of Wales and provides extensive experience. There is also a Senior House Officer in orthopædics. Salary £745, less £150 board-residence.

Write, quoting 2 referees, to T. A. JONES, Group Secretary. 64, Cardiff-road, Newport, Mon.

CHERTSEY, SURREY. ST. PETER'S HOSPITAL (late Botley's Park War Hospital). (430 Beds.) SENIOR HOUSE OFFICER ANÆSTHETIST required. Appointment recognised for D.A. and F.F.A.R.C.S. Duties to commence second week in August. Salary in accordance with terms and conditions of National Health Service.

Applications, together with names and addresses of referees, to be sent to the Physician-Superintendent, St. Peter's Hospital, as soon as possible.

CHICHESTER. ROYAL WEST SUSSEX HOSPITAL. (202 acute beds.) SENIOR HOUSE SURGEON (Deputy Resident Surgical Officer) required at above Hospital. Post recognised for F.R.C.S. Resident staff of 6—Resident Surgical Officer, 3 House Surgeons, Resident Medical Officer and House Physician. Salary £745 p.a., less residential charge. Vacant early August.

Applications, stating age, experience, qualifications with references or names of referees, to Senior Administrative Officer.

COLCHESTER. ESSEX COUNTY HOSPITAL. (189 Beds.) Applications invited for post of SENIOR HOUSE OFFICER (anæsthetics). Post tenable for 1 year. Recognised for D.A. The successful candidate will be called upon to give anæsthetics in other hospitals in the Group.

Applications, with copies of 3 testimonials, to Group Secretary, Colchester Hospital Management Committee, 14, Pope's-lane, Colchester, Essex.

COLCHESTER HOSPITAL MANAGEMENT COM-MITTEE. Applications are invited for :—

Black Notley Hospital, Braintree, Essex (544 Beds)

HOUSE OFFICER (orthopædic surgery). First, second, third, or pre-registration post ; tenable for 6 months. Recognised for F.R.C.S.

Applications, with copies of 3 testimonials, to Group Secretary, Colchester Hospital Management Committee, 14, Pope's-lane, Colchester, Essex.

COTTINGHAM. CASTLE HILL HOSPITAL. Hull B HOSPITAL MANAGEMENT COMMITTEE. JUNIOR HOSPITAL MEDICAL OFFICER to work in Major Thoracic Surgery Unit. Residential accommodation available. The Unit has 50 Beds for all types of thoracic surgery, including tuberculous and non-tuberculous, œsophageal and cardiac.

Applications, with names of referees, to Group Secretary, De la Pole Hospital, Willerby, East Yorkshire.

CROYDON GROUP HOSPITAL MANAGEMENT COM-MITTEE. Locum Tenens ANÆSTHETIC REGISTRAR (wholetime) for Group for period 20th August–18th September. Candidates must have experience in anæsthetics. Hospitals recognised for F.F.A.R.C.S. and D.A.

Applications, giving full particulars, to—
GEORGE A. PAINES, Group Secretary,
Hospital Management Committee.
General Hospital, Croydon.

DERBY. CITY HOSPITAL. House Surgeon (pre-registration) or SENIOR HOUSE OFFICER (surgical). Recognised for the F.R.C.S. Vacant in September.

Apply, stating full details, together with copies of 2 recent testimonials, to the Medical Superintendent.

DERBY. DERBYSHIRE ROYAL INFIRMARY. House SURGEON (pre-registration) or SENIOR HOUSE OFFICER (gynæcology), vacant 22nd August, 1955. Recognised for M.R.C.O.G.

Apply, stating full details with copies of 2 recent testimonials, to Hospital Secretary.

DERBY. DERBYSHIRE ROYAL INFIRMARY. Senior HOUSE OFFICER (casualty), vacant immediately. Recognised for F.R.C.S.

Apply with copies of 2 testimonials, to Secretary.

DONCASTER ROYAL INFIRMARY. (330 Beds.) DONCASTER HOSPITAL MANAGEMENT COMMITTEE. Applications are invited for the post of HOUSE SURGEON. Approved as pre-registration post and recognised for F.R.C.S. Vacant mid-August.

Applications to the Secretary to the Committee at the Doncaster Royal Infirmary.

DOUGLAS. NOBLE'S ISLE OF MAN HOSPITAL. (160 Beds.) HOUSE SURGEON required. House Officer grade post, becomes vacant 1st September, 1955. Hospital, approved for Pre-registration Service, has busy general surgical practice. 4 residents on staff. Salary scale £425–£475–£525 according to experience.

Applications, giving full particulars, with copies of 2 recent testimonials, to the Secretary, Noble's Isle of Man Hospital, Douglas.

DUDLEY, STOURBRIDGE AND DISTRICT HOSPITAL GROUP, BIRMINGHAM REGION.

The Corbett Hospital, Stourbridge (106 Beds)
SENIOR HOUSE OFFICER (casualty).

The Guest Hospital, Dudley (154 Beds)
SENIOR HOUSE OFFICER (casualty). Post recognised for F.R.C.S. examination.
SENIOR HOUSE OFFICER (anæsthetics). Post vacant August.

Wordsley Hospital, near Stourbridge (478 Beds)
SENIOR HOUSE OFFICER (anæsthetics). Resident. Previous experience house appointments essential. Experience available general surgery, gynæcology, orthopædics, plastic surgery unit.
SENIOR HOUSE OFFICER (medical). Post vacant July.
Applications, stating age, experience, with copies of 3 recent testimonials, to Group Secretary, The Guest Hospital, Dudley, Worcs.

EDGWARE GENERAL HOSPITAL, Edgware, Middlesex. Locum CASUALTY REGISTRAR (non-resident) required for 2 weeks commencing 27th August, 1955, at above Hospital.

Apply immediately to Medical Director.

EDINBURGH. PRINCESS MARGARET ROSE HOS-PITAL. Applications are invited from registered medical practitioners and pre-registration graduates for the appointment of RESIDENT HOUSE SURGEON in above Hospital for 6 months commencing 1st October, 1955. Whitley Council scale.

Applications, stating age, qualifications and experience, and names of 2 referees, to be sent immediately to Medical Superintendent, Edinburgh Central Hospitals, 18, Rillbank-terrace, Edinburgh, 9.

ENFIELD, MIDDLESEX. CHASE FARM HOSPITAL. ENFIELD GROUP HOSPITAL MANAGEMENT COMMITTEE. Locum REGISTRAR in Orthopædics required 15th–28th August, 1955. Non-resident.

Apply Group Secretary with names of 2 referees.

EPPING. ST. MARGARET'S HOSPITAL. (482 Beds.) SENIOR HOUSE OFFICER (pathology). Post vacant 1st September, 1955. Salary on national scale, less deduction for board, lodging, &c. Busy department in large general hospital with easy access to London. Some experience in pathological department desirable.

Applications, with copies of 2 recent testimonials, to the Group Secretary, Epping Group Hospital Management Committee, St. Margaret's Hospital, Epping, Essex, by 12th August, 1955.

EPSOM DISTRICT HOSPITAL, Dorking-road, Epsom, SURREY. SENIOR HOUSE OFFICER (casualty) required 1st October. Post recognised for F.R.C.S. 12 months appointment. Busy Casualty and Outpatient Department with excellent experience in mirror and traumatic surgery. Candidates should have held previous House Officer posts.

Applications, stating age, qualifications, experience with copies of 2 recent testimonials, should be sent as soon as possible to Group Secretary at above address.

EPSOM, SURREY. ST. EBBA'S HOSPITAL. St. Ebba's AND BELMONT GROUP HOSPITAL MANAGEMENT COMMITTEE. SOUTH WEST METROPOLITAN REGIONAL HOSPITAL BOARD. Applications are invited for the appointment of SENIOR REGISTRAR at above Hospital. The Hospital (865 Beds) is principally concerned with the treatment of voluntary cases of good prognosis and has over 1300 admissions annually. There are full facilities for psychological and physical investigations and all modern treatment methods are used. The hospital has Outpatient Departments and a special unit for juvenile psychiatric cases. Full residential amenities are available. Candidates should possess the D.P.M. Candidates may visit the Hospital by appointment with the Physician-Superintendent.

Application forms may be obtained from the Group Secretary, St. Ebba's and Belmont Group Hospital Management Committee, Group Office, Belmont Hospital, Brighton-road, Sutton, Surrey, and completed forms should be returned to him within 2 weeks of the appearance of this advertisement.

GRANTHAM AND KESTEVEN GENERAL HOSPITAL. (115 Beds.) SHEFFIELD REGIONAL HOSPITAL BOARD. SECOND RESIDENT SURGICAL OFFICER with duties in orthopædics, gynæcology, E.N.T., and relief duties for Resident Surgical Officer, required at Registrar rate of pay from 7th September. Appointment for 1 year in first instance.

Apply to Secretary, Sheffield Regional Hospital Board, Old Fulwood-road, Sheffield, by 8th August, 1955, giving age, nationality, qualifications, present and previous appointments with dates, naming 3 referees.

GLASGOW, N.1. STOBHILL GENERAL HOSPITAL. PSYCHIATRIC UNIT. HOUSE OFFICERS (resident), Male or Female, required 1st August, 1955. 180 Beds. 1500 admissions yearly, acute treatable cases. Unit recognised for D.P.M.

Apply to Medical Superintendent.

GLASGOW, N.1. STOBHILL GENERAL HOSPITAL. In the term beginning 1st August, vacancies for HOUSE OFFICERS (pre-registration) exist in the following unit : Medicine (Acute Geriatrics).

Applications, giving the names of 2 referees, should be addressed to the Medical Superintendent.

GLASGOW, N.1. STOBHILL GENERAL HOSPITAL. Applications are invited for the post of JUNIOR HOSPITAL MEDICAL OFFICER in the acute Geriatric Unit (70 Beds—for assessment and rehabilitation) supervised by a Consultant Physician specialising in geriatrics. The appointment offers excellent clinical experience in the diagnosis and treatment of acute and other illnesses in the elderly and will be for 2 years in the first instance.

Applications, stating age, qualifications and experience, with the names of 2 referees, to be sent to the Medical Superintendent.

GLASGOW. ROYAL HOSPITAL FOR SICK CHILDREN, YORKHILL, GLASGOW. Applications are invited for the post of SENIOR HOUSE OFFICER (resident) in Surgical Paediatrics at the above Hospital. National Health Service salary and conditions of service.

Applications, with names of 3 referees, to be lodged with the Secretary, Board of Management, for Glasgow and District Children's Hospital, 86, St. Vincent-street, Glasgow, C.2.

GLASGOW ROYAL INFIRMARY. Senior House Officer in General Medicine. Duties at above Infirmary.

Write, giving 3 names for reference, not later than 13th August, 1955, to the Secretary, Board of Management for Glasgow Royal Infirmary and Associated Hospitals, 135, Buchanan-street, Glasgow, C.1.

GUILDFORD. ROYAL SURREY COUNTY HOSPITAL. (232 Beds.) HOUSE SURGEON required to Orthopædic and Traumatic Unit. The post is tenable for 6 months from 12th September, is recognised for the F.R.C.S. examination, and is open to pre-registration candidates.

Applications, with copies of 3 testimonials, should be sent to the Hospital Secretary as soon as possible.

HALIFAX GENERAL HOSPITAL. (425 Beds.) House SURGEON required. Approved pre-registration appointment, recognised for F.R.C.S. Post vacant August.

Apply to Group Secretary, Royal Halifax Infirmary, Halifax.

HALIFAX GENERAL HOSPITAL. (425 Beds.) Senior HOUSE OFFICER in Anæsthetics required. Salary £745 p.a., with deduction of £130 p.a. for board, residence, &c.

Apply to Group Secretary, Royal Halifax Infirmary, Halifax.

HASTINGS. ROYAL EAST SUSSEX HOSPITAL. (159 Beds.) SENIOR HOUSE OFFICER (casualty and orthopædic) required. Post vacant 1st September, 1955. National scale of salary.

Apply to Hospital Administrator.

HASTINGS GROUP HOSPITAL MANAGEMENT COM-MITTEE. SENIOR HOUSE OFFICER (anæsthetics) required for duties within the Group. Post, recognised for Diploma in Anæsthetics, will be vacant in September. National scale of salary £745 p.a.

Apply to Group Secretary, 11, Holmesdale-gardens, Hastings.

HEXHAM GENERAL HOSPITAL, Northumberland. (314 Beds.) Applications are invited for the post of SENIOR HOUSE OFFICER in General Surgery at the above Hospital, a hospital recognised by the Royal College of Surgeons.

Applications, giving full details of experience, &c., with the names and addresses of 2 referees, should be sent to the Group Secretary, General Hospital, Hexham, Northumberland, as early as possible and stating whether single or married accommodation is required.

HITCHIN, HERTFORDSHIRE. LISTER HOSPITAL. Applications are invited for the post of RESIDENT HOUSE PHYSICIAN, vacant 18th August, 1955. (Recognised as pre-registration post.)

Applications, stating age, nationality, qualifications and experience, together with copies of 3 recent testimonials, to be sent to the Medical Administrator as soon as possible.

HORNCHURCH. ST. GEORGE'S HOSPITAL. (Neurosis UNIT.) Locum REGISTRAR in Psychiatry required for 6 weeks between July and September.

Applications, with dates available and names of 2 referees, to Group Secretary, Oldchurch Hospital, Romford, from whom further information can be obtained.

HOUNSLOW GENERAL HOSPITAL. (81 Beds.) Applications are invited for the appointment of RESIDENT CASUALTY OFFICER (Senior House Officer grade), recognised for F.R.C.S. examination. Post vacant 30th August, 1955.

Applications, stating age, qualifications, experience, with copies of 3 recent testimonials or names for reference, to the Hospital Secretary, Hounslow Hospital, Staines-road, Hounslow, Middlesex.

HOUNSLOW HOSPITAL, Staines-road, Hounslow, MIDDLESEX. (General acute—81 Beds.) NORTH WEST METROPOLITAN REGIONAL HOSPITAL BOARD. RESIDENT SURGICAL REGISTRAR required for 1 year in first instance. Recognised for F.R.C.S. Post vacant 1st September. Candidates may visit the Hospital by direct appointment with the Hospital Secretary.

Application forms obtainable from, and returnable to, Group Secretary, Staines Group Hospital Management Committee, Ashford Hospital, London-road, Ashford, Middlesex, not later than 10th August.

HOUNSLOW HOSPITAL, Staines-road, Hounslow, MIDDLESEX. (General acute—81 Beds.) Locum RESIDENT SURGICAL REGISTRAR required from 1st September. Salary £17 10s. per week, less charge for residence.

Apply to Hospital Secretary (Telephone : HOUnslow 4448).

HOVE GENERAL HOSPITAL, Sussex. (75 Beds. 3 Resident Medical Officers.) HOUSE SURGEON AND CASUALTY OFFICER (recognised for F.R.C.S.—not pre-registration) required as soon as possible. Salary £525, less £125 p.a. for residential emoluments.

Applications, stating age, qualifications, experience, and naming 2 referees, to the Administrative Officer within 7 days of the appearance of this advertisement.

HULL A GROUP HOSPITAL MANAGEMENT COM-MITTEE. SENIOR HOUSE OFFICER required from 1st September, 1955, for duties in the E.N.T. Departments of the Victoria Hospital for Sick Children, and the Hull Royal Infirmary.

Applications, with testimonials, to be sent to the Secretary, Victoria Hospital for Sick Children, Park-street, Hull.

HULL. VICTORIA HOSPITAL FOR SICK CHILDREN, Park-street. HULL A GROUP HOSPITAL MANAGEMENT COMMITTEE. HOUSE SURGEON required on 20th August, 1955. Pre-registration or registration post. 6-monthly term, recognised for D.C.H. qualification. Salary according to national scale.

Send replies, with testimonials, to the Hospital Secretary.

HUDDERSFIELD ROYAL INFIRMARY. (312 Beds.) HUDDERSFIELD HOSPITAL MANAGEMENT COMMITTEE. HOUSE SURGEON required to commence duty immediately. The post is recognised as a pre-registration appointment and for the F.R.C.S. Salary in accordance with national scale.

Applications, together with copies of 3 recent testimonials, to be addressed to the undersigned as soon as possible.

H. J. JOHNSON, Secretary to the Management Committee.

The Royal Infirmary, Huddersfield.

ILFORD. KING GEORGE HOSPITAL. There will be a vacancy for a CASUALTY OFFICER at the above Hospital on 1st September, 1955, at a salary of £745 p.a., less £145 p.a. emoluments. Senior House Officer grade. This post is recognised for the F.R.C.S.

Applications, giving full particulars and accompanied by testimonials, should be sent to the undersigned within 7 days of the appearance of this advertisement.

H. F. HARRIS, Secretary,

Ilford and Barking Group Hospital Management Committee.

King George Hospital, Ilford.

ILFORD MATERNITY HOSPITAL, Eastern-avenue, ILFORD. There will be a vacancy for a SENIOR HOUSE OFFICER (obstetrics and also entails the care of some gynæcological beds) at the above Hospital on 1st September, 1955. Salary will be at the rate of £745 p.a., less emoluments. This post is recognised for training for the D.Obst.R.C.O.G.

Applicants should have been registered not less than 1 year and should send applications, accompanied by copies of 3 testimonials, to the undersigned within 7 days of the appearance of this advertisement.

H. F. HARRIS, Secretary,

Ilford and Barking Hospital Management Committee.

King George Hospital, Ilford.

IPSWICH AND EAST SUFFOLK HOSPITAL (Anglo-SEA ROAD WING). (356 Beds.) Applications are invited for the post of SENIOR HOUSE OFFICER (Resident Anæsthetist). The post, which becomes vacant on 5th September, 1955, and is normally of 1 years duration, is recognised for the D.A. and the F.F.A.R.C.S. examinations.

Applications, stating age and nationality, together with recent testimonials, to Hospital Secretary.

ISLEWORTH. WEST MIDDLESEX HOSPITAL. North WEST METROPOLITAN REGIONAL HOSPITAL BOARD. REGISTRAR (pædiatrics), non-resident, vacant 15th August, 1955. 1 year in first instance and subject to review. Previous experience in pædiatrics essential. Higher qualifications D.C.H. or M.R.C.P. desirable. Duties will include care of children in unit, newborns and prematures wards, attendance at out-patient clinics, participation in teaching of postgraduate students and lectures to nurses and midwives in training. Candidates may visit by appointment.

Application forms obtainable from, and returnable to, Group Secretary, South West Middlesex Hospital Management Committee, West Middlesex Hospital, Isleworth, by 9th August, 1955.

KIRKCALDY GENERAL HOSPITAL. (74 surgical beds.) HOUSE SURGEON required as at 1st August or 1st September, preferably the former. The post qualifies for pre-registration.

Apply, with copies of 2 recent testimonials, to the Medical Superintendent, East Fife Hospitals Board of Management, 243A, High-street, Kirkcaldy.

LIVERPOOL. THE UNITED LIVERPOOL HOSPITALS. ROYAL LIVERPOOL CHILDREN'S HOSPITAL. Applications are invited for a temporary appointment of SENIOR CASUALTY OFFICER (Senior House Officer grade) for the period 31st March, 1956. The person appointed may choose to be resident or non-resident.

Apply by 10th August, 1955, on forms obtainable from the Secretary, 80, Rodney-street, Liverpool, 1.

LEEDS, 2. PUBLIC DISPENSARY AND HOSPITAL. LEEDS A GROUP HOSPITAL MANAGEMENT COMMITTEE. Applications are invited from registered medical practitioners for the appointment of CASUALTY OFFICER (Senior House Officer) at the above Hospital. The appointment, which is recognised by the Royal College of Surgeons for Fellowship, will be for a period of 1 year. Salary in accordance with the agreed terms and conditions of service of hospital medical and dental staffs, with an appropriate deduction in respect of board, lodging, &c.

Applications, stating age, qualifications, experience, &c., together with the names of 2 referees, to be forwarded to the undersigned as soon as possible.

J. FOLKARD, Secretary to the Committee.

Administrative Offices, St. James's Hospital, Leeds, 9.

LEEDS REGIONAL HOSPITAL BOARD. Registrar vacancies.

General and Orthopædic Surgery

Halifax General Hospital (50 surgical beds) and Halifax Royal Infirmary (60 orthopædic beds). Duties approximately divided between general and orthopædic surgery (preferably resident).

Orthopædic Surgery

Bradford Royal Infirmary (60 orthopædic beds) with additional duties as required at other Orthopædic Units in the Bradford A Group (non-resident).

Psychiatry

(*a*) Duties mainly at Bootham Park (202 Beds), near centre of City of York. Accommodation for single person. Post may be resident or non-resident.

(*b*) Menston Hospital, near Leeds (2500 Beds) (resident).

(*c*) De la Pole Hospital, Willerby, and associated clinics (resident or non-resident).

If desired facilities for attendance at the Leeds University will be provided if the successful candidates are studying for the D.P.M.

Applications, stating age, qualifications and details of appointments held showing dates, with names and addresses of 3 referees, to the Secretary, Joint Registrars Committee, Park-parade, Harrogate, by 11th August, 1955.

LEEDS, 9. ST. JAMES'S HOSPITAL. Leeds A Group HOSPITAL MANAGEMENT COMMITTEE. Applications are invited from registered medical practitioners (Male and Female) for the appointment of SENIOR HOUSE OFFICER (orthopædics). The appointment, which is recognised by the Royal College of Surgeons for Fellowship, will be for a period of 1 year and the salary will be in accordance with the agreed terms and conditions of service of hospital medical and dental staffs, namely, £745 p.a. with an appropriate deduction in respect of board, lodgings, and other services provided.

Applications, stating age, qualifications, experience, &c., together with the names of 2 referees, to be forwarded to the undersigned as soon as possible.

J. FOLKARD, Secretary to the Committee.

Administrative Offices, St. James's Hospital, Leeds, 9.

LEAMINGTON SPA. WARNEFORD HOSPITAL. (197 Beds.) SENIOR HOUSE OFFICER (anæsthetics) for duties at the above Hospital. Post vacant and recognised for D.A.

Applications to Hospital Secretary.

MAIDENHEAD HOSPITAL, St. Luke's-road, Maidenhead. RESIDENT SURGICAL REGISTRAR required at above Hospital. Hospital may be visited by direct appointment.

Application forms obtainable from, and returnable to, Secretary, Windsor Group Hospital Management Committee, Almaroad, Windsor, by 5th August.

MAIDSTONE. KENT COUNTY OPHTHALMIC AND AURAL HOSPITAL. (113 Beds.) MID-KENT HOSPITAL MANAGEMENT COMMITTEE. Applications are invited for the appointment of SENIOR HOUSE SURGEON in the E.N.T. Department of the above Hospital. Post vacant 1st October, 1955. There are 55 E.N.T. beds and 6 specialist operating sessions each week. Valuable experience is available, and the post is recognised for the purpose of the F.R.C.S. and the D.L.O. Salary will be £745 a year, less £150 a year for residential emoluments.

Applications immediately to the Administrative Officer, Kent County Ophthalmic and Aural Hospital, Maidstone, Kent.

MAIDSTONE. KENT COUNTY OPHTHALMIC AND AURAL HOSPITAL. (113 Beds.) MID-KENT HOSPITAL MANAGEMENT COMMITTEE. Applications are invited for the appointment of SENIOR HOUSE SURGEON in the Ophthalmic Department of the above Hospital. The Hospital is recognised by the Examining Board for the F.R.C.S. and the D.L.O. Appointment will be for 12 months. Salary £745 a year, less £150 a year for residential emoluments. Post vacant mid-October, 1955.

Applications should be forwarded as soon as possible to the Administrative Officer, Kent County Ophthalmic and Aural Hospital, Church-street, Maidstone.

MAIDSTONE. WEST KENT GENERAL HOSPITAL. (141 Beds.) MID-KENT HOSPITAL MANAGEMENT COMMITTEE. Applications are invited for the appointment of RECEIVING ROOM OFFICER. Salary £745 a year, with a deduction of £150 a year for residential emoluments.

Applications to the Administrative Officer at the Hospital as soon as possible.

MANCHESTER. WEST MANCHESTER HOSPITAL MANAGEMENT COMMITTEE. PARK HOSPITAL, DAVYHULME. (General Hospital—433 Beds.) 1 SENIOR HOUSE OFFICER (non-tuberculous thoracic surgery) required for Manchester Regional Hospital Board Centre. Post now vacant.

Forms from Secretary.

MANCHESTER. UNITED MANCHESTER HOSPITALS. MANCHESTER ROYAL INFIRMARY, MANCHESTER, 13. SENIOR HOUSE OFFICER to the Department of Hæmatology, to commence on 14th November, 1955. Whole-time, non-resident post. Appointment for 6 months, renewable for a second and possibly a third 6 months.

Applications to be made on forms obtainable from the undersigned and to be returned not later than 13th August, 1955.

G. H. TAYLOR, Secretary.

MANCHESTER. UNITED MANCHESTER HOSPITALS. MANCHESTER ROYAL INFIRMARY, MANCHESTER, 13. 2 REGISTRARS to the Department of Diagnostic Radiology, to commence as soon as possible. Whole-time, non-resident appointments for 12 months, renewable. Applicants must possess the D.M.R.D. or its equivalent.

Application to be made on form obtainable from the undersigned and to be returned not later than 13th August, 1955.

G. H. TAYLOR, Secretary.

MANCHESTER. UNITED MANCHESTER HOSPITALS. SAINT MARY'S HOSPITALS, MANCHESTER. Applications are invited for 4 posts of HOUSE OFFICER in Gynæcology. Applicants must have had previous hospital experience in medicine and surgery. The posts are recognised for the purposes of the M.R.C.O.G. examination. The appointments are for 6 months starting 1st October, 1955. Salary in accordance with national scale.

Application forms may be obtained from the undersigned and returned not later than 19th August, 1955.

A. R. WISE, General Superintendent.

Saint Mary's Hospitals, Whitworth Park, Manchester, 13.

MANCHESTER. UNITED MANCHESTER HOSPITALS. SAINT MARY'S HOSPITALS, MANCHESTER. Applications are invited for the post of SENIOR HOUSE OFFICER in Obstetrics. Applicants must have had previous hospital experience in general medicine and surgery, and in obstetrics. The post is recognised for purposes of the M.R.C.O.G. examination. The duties involve clinical responsibility for mothers and babies, and supervision of the work of pre-registration House Officers is also included. The appointment is for 12 months from 1st November, 1955. National scale.

Application forms may be obtained from the undersigned and returned not later than 22nd August, 1955.

A. R. WISE, General Superintendent.

Saint Mary's Hospitals, Whitworth Park, Manchester, 13.

MANCHESTER. ANCOATS HOSPITAL. (Acute—153 Beds.) NORTH MANCHESTER HOSPITAL MANAGEMENT COMMITTEE. Applications are invited for the post of REGISTRAR in General Surgery. Recognised for F.R.C.S.

Applications immediately, with full details and names of 2 referees, to Group Secretary, Crumpsall Hospital, Manchester, 8.

MANCHESTER. DUCHESS OF YORK HOSPITAL FOR BABIES AND WYTHENSHAWE HOSPITAL. SOUTH MANCHESTER HOSPITAL MANAGEMENT COMMITTEE. Applications are invited from registered practitioners for the post of SENIOR HOUSE OFFICER (pædiatrics), vacant 20th September, 1955. A joint post of not less than 3 months and preferably 6 months at each Hospital is recognised as training for the D.C.H. The Duchess of York Hospital is also attached to the Manchester University Department of Child Health.

Applications, with full details, to the Group Secretary, Withington Hospital, Manchester, 20, within 7 days of the appearance of this advertisement.

MANCHESTER, 20. WITHINGTON HOSPITAL. South MANCHESTER HOSPITAL MANAGEMENT COMMITTEE. Applications are invited for the post of SENIOR HOUSE OFFICER to the Geriatric Department which will become vacant in August (resident or non-resident). Duties are primarily in the active medical wards. Excellent experience is available in the Unit which has been developed on modern lines and has available full general hospital facilities.

Applications, stating age, qualifications, present post, experience and the names of 2 referees, to be forwarded to the Group Secretary at the Hospital immediately.

MANCHESTER REGIONAL HOSPITAL BOARD invites applications for the post of RESIDENT REGISTRAR in Obstetrics and Gynæcology. The duties will be with the Stockport and Buxton Hospital Management Committee, mainly at Stepping Hill Hospital and Stockport Infirmary, where there are 68 obstetric and 48 gynæcological beds. The post is recognised for M.R.C.O.G. and is vacant 1st October, 1955.

Applications, stating age, experience and qualifications, together with the names of 2 referees, to be forwarded to—

H. G. PRICE, Group Secretary.

59B, Shaw-heath, Stockport, Cheshire.

MANCHESTER REGIONAL HOSPITAL BOARD invite applications for the post of REGISTRAR in Orthopædic Surgery, to the Blackpool and Fylde Group of hospitals, with main duties at Victoria Hospital, Blackpool.

Applications, together with names and addresses of 2 referees, should be sent to the Group Secretary, Blackpool and Fylde Hospital Management Committee, Victoria Hospital, Blackpool.

MANCHESTER REGIONAL HOSPITAL BOARD invite applications for the post of REGISTRAR in the Department of Thoracic Surgery at the Victoria Hospital, Blackpool (main centre), with additional duties at other hospitals in the North Lancashire area. The post offers excellent opportunities for gaining experience under 2 Consultant Thoracic Surgeons.

Applications, together with the names of 2 referees or references, should be sent to the Group Secretary, Victoria Hospital, Blackpool.

MANCHESTER REGIONAL HOSPITAL BOARD.

(*a*) 2 posts of SENIOR REGISTRAR in Radiology, 1 in the North Manchester Group of hospitals (Crumpsall, Ancoats, Northern and Manchester Victoria Memorial Jewish Hospitals) and at Booth Hall (Children's) Hospital, and 1 in the South Manchester Group of hospitals at Withington Hospital. Arrangements may later be made for the persons appointed to transfer to the United Manchester Hospitals for further experience and training.

(*b*) SENIOR REGISTRAR in General Medicine in the South Manchester Group of hospitals, mainly at Withington Hospital, Manchester. M.R.C.P. desirable. Arrangements may later be made for the person appointed to transfer to the United Manchester Hospitals (Manchester Royal Infirmary) for further experience and training.

Application forms from the Senior Administrative Medical Officer to the Board, Cheetwood-road, Manchester, 8, to be returned by 8th August, 1955.

(*c*) Locum SENIOR REGISTRAR in General Medicine, Salford Royal Hospital. Period 1st September, 1955–31st May, 1956. Salary £24 a week.

Applications, giving full particulars and names of 2 referees, to be forwarded to the Senior Administrative Medical Officer, Cheetwood-road, Manchester, 8, to be received by 8th August, 1955.

MANCHESTER REGIONAL HOSPITAL BOARD. Salford HOSPITAL MANAGEMENT COMMITTEE. Applications are invited for the post of NON-RESIDENT REGISTRAR in E.N.T. Surgery in the above Group with main duties at Hope Hospital and the Royal Manchester Children's Hospital.

Applications to the Group Secretary, Salford Royal Hospital, Salford, 3, before 13th August, 1955.

MANCHESTER REGIONAL HOSPITAL BOARD. South MANCHESTER HOSPITAL MANAGEMENT COMMITTEE. WYTHENSHAWE HOSPITAL, MANCHESTER. The Board invite applications from registered practitioners for the post of MEDICAL REGISTRAR.

Applications, stating age, qualifications, present post, experience and names of 2 referees, to be forwarded to the Group Secretary at the Hospital within 7 days of the appearance of this advertisement.

MANCHESTER REGIONAL HOSPITAL BOARD invite applications for the post of REGISTRAR in Chest Diseases to the Wigan and Leigh and Wrightington Groups of hospitals. 2 busy chest clinics and opportunity to gain experience in Thoracic Surgical Unit.

Applications, together with the names of 2 referees, to the Secretary, Wigan and Leigh Hospital Management Committee, Knowsley House, Wigan, to be received not later than 4th August, 1955.

MANCHESTER REGIONAL HOSPITAL BOARD invite applications for REGISTRAR in Psychiatry (resident or non-resident) for duties at hospitals in the Wigan and Leigh Group. The person appointed will be required to assist the Consultant Psychiatrist at consultative clinics, and with inpatient treatments, &c. The main centre is at Billinge Hospital where there is an active Psychiatric Unit with all modern treatments. Over 300 admissions annually. Good training facilities are available for anyone desiring to specialise in psychiatry. The post is recognised for D.P.M.

Applications, together with names of 2 referees, to the Secretary, Wigan and Leigh Hospital Management Committee, Knowsley House, Wigan.

NEWCASTLE REGIONAL HOSPITAL BOARD. Cherry KNOWLE HOSPITAL, RYHOPE, SUNDERLAND. (850 Beds.) Locum REGISTRAR PSYCHIATRIST required for the above Hospital for 2–4 months. Single accommodation available. Salary £17 10s. per week.

Applications, with names and addresses of 3 referees, to Regional Psychiatrist, "Blythswood South," Osborne-road, Newcastle upon Tyne, within 7 days.

NEWPORT, MONMOUTHSHIRE. ROYAL GWENT HOSPITAL. (260 Beds. Recognised F.F.A.R.C.S. and D.A.) SENIOR HOUSE OFFICER in Anæsthetics required. Non-resident. Previous experience in speciality not essential. The successful candidate will receive a thorough training in the specialty and will also attend the other General Hospital nearby in Newport with the Consultants. Good and varied experience. Salary £745.

Write, quoting 2 referees, to T. A. JONES, Group Secretary. 64, Cardiff-road, Newport, Mon.

NORTHWOOD, MIDDLESEX. MOUNT VERNON HOSPITAL. (555 Beds.) NORTH WEST METROPOLITAN REGIONAL HOSPITAL BOARD. REGISTRAR required in the X-ray Diagnostic Department at above Hospital for 1 year in first instance.

Application forms obtainable from, and returnable to, the Secretary, Harefield and Northwood Group Hospital Management Committee, Mount Vernon Hospital, Northwood, Middlesex. Hospital may be visited by direct appointment.

NORWICH. HELLESDON HOSPITAL. East Anglian REGIONAL HOSPITAL BOARD. REGISTRAR in Psychiatry. Associated with this modern mental hospital (960 Beds) are a separate early treatment hospital with an electro-encephalographic department, outpatient clinics for both adults and children, and a special unit for the elderly mentally infirm. Post recognised for D.P.M. House available. Appointment for 1 year, renewable for second year.

Applications, stating age, experience, and names of 3 referees, to Secretary of Board, 117, Chesterton-road, Cambridge, by 8th August, 1955. Candidates invited to visit Hospital by direct arrangement with Medical Superintendent.

NORWICH. NORFOLK AND NORWICH HOSPITAL. (441 Beds.) EAST ANGLIAN REGIONAL HOSPITAL BOARD. SURGICAL REGISTRAR. Post provides wide experience and recognised for F.R.C.S. Appointment for 1 year, renewable for second year.

Applications, stating age, experience, and names of 3 referees, to Secretary of Board, 117, Chesterton-road, Cambridge, by 15th August, 1955. Candidates are invited to visit Hospital by direct arrangement with Hospital Management Committee Secretary at the Hospital.

NOTTINGHAM AND MIDLAND EYE INFIRMARY. Required, 2 SENIOR HOUSE OFFICERS, duties to commence immediately and 31st July. Salary and conditions of service in accordance with Ministry regulations.

Applications, stating age, qualifications and experience, together with copies of testimonials, to be sent to the Group Secretary, General Hospital, Nottingham.

NOTTINGHAM GENERAL HOSPITAL. Applications are invited from registered medical practitioners for the post of SENIOR ORTHOPÆDIC AND FRACTURE HOUSE OFFICER duties to commence early September. The post offers exceptional experience in traumatic surgery. Salary and conditions of service in accordance with Ministry Regulations.

Applications, stating age, qualifications and experience, nationality, &c., together with copies of testimonials, to be sent to the Group Secretary.

NOTTINGHAM GENERAL HOSPITAL. Applications are invited for the post of CLINICAL PATHOLOGIST (Senior House Officer grade), resident or non-resident; duties to commence as soon as possible. Previous experience in pathology not essential. Opportunities for training in all branches of clinical pathology are afforded in a department serving over 1200 beds. Salary and conditions of service in accordance with Ministry regulations.

Applications, stating names and addresses of 3 referees, to be received within 2 weeks of this advertisement addressed to the Secretary.

NOTTINGHAM GENERAL HOSPITAL. Hogarth Radio-THERAPY CENTRE. A vacancy exists at the above Centre for a SENIOR HOUSE OFFICER in Radiotherapy or REGISTRAR (if in possession of Part I, D.M.R.T.) in Radiotherapy. The Centre is recognised as a Training School for both Part I and II D.M.R.T. (Royal Colleges of London) in conjunction with the University of Nottingham, and instruction for this examination can be given to those interested and suitable. The position offers excellent experience for persons studying for other post-graduate degrees.

Apply as soon as possible, stating age, qualifications and experience, together with names of 3 referees, to the Group Secretary, General Hospital, Nottingham.

OSWESTRY. THE ROBERT JONES AND AGNES HUNT ORTHOPÆDIC HOSPITAL. SENIOR SURGICAL HOUSE OFFICER (resident) required. Appointment in the first place for 6 months with a possibility of extension.

Applications, with copies of 2 recent testimonials, to be sent to the Secretary at once.

OTLEY, YORKSHIRE. THE GENERAL HOSPITAL. (172 Beds.) ILKLEY AND OTLEY HOSPITAL MANAGEMENT COMMITTEE. RESIDENT MEDICAL OFFICER required (general medicine and pædiatrics). Junior Hospital Medical Officer or Senior House Officer. Full Consultant staff who are members of the Teaching staff of The University of Leeds. Single quarters in hospital or unfurnished self-contained flat nearby. Duties to commence on 1st September, 1955.

Applications, stating age, nationality and experience, with names of 2 referees, to the Group Secretary as soon as possible.

OXFORD REGIONAL HOSPITAL BOARD. Registrar to the Warneford and Park Hospital, Oxford. The Warneford Hospital (140 Beds) is being developed as an acute Psychiatric Unit. A research programme is being undertaken and post-graduate training is emphasised. The Park Hospital is an associated Neurosis Centre (30 Beds) with daily outpatient clinics including children. Full training facilities including neurology, child guidance and mental deficiency, are available for D.P.M. purposes. Candidates should preferably be young graduates starting the specialist study of psychiatry. Accommodation for single person available. Successful candidate will be required to join about 1st October.

Applications, on forms obtainable from the Secretary, Registrar Committee, 43, Banbury-road, Oxford, should reach him by 15th August.

PETERBOROUGH. MEMORIAL HOSPITAL. Peter-BOROUGH AND STAMFORD HOSPITAL MANAGEMENT COMMITTEE. Applications are invited for the following appointments:—

HOUSE SURGEON, vacant now.

HOUSE PHYSICIAN, vacant on 22nd August, 1955.

Applications, with testimonials should be addressed to the Secretary, Memorial Hospital, Peterborough.

PLYMOUTH, SOUTH DEVON AND EAST CORNWALL GENERAL HOSPITAL GROUP. AREA PATHOLOGICAL DEPARTMENT. Applications invited from duly qualified and registered medical practitioners for the appointment of RESIDENT SENIOR HOUSE OFFICER in Pathology, vacant 1st September, 1955. The appointment will be for a period of 12 months, in the Area Laboratory at the South Devon and East Cornwall Hospital, Greenbank-road, Plymouth, which provides excellent modern working facilities.

Applications, stating age, nationality, qualifications, and experience, together with the names and addresses of 3 referees, to be sent to ARTHUR R. CASH, Group Secretary.

7, Nelson-gardens, Stoke, Plymouth.

PLYMOUTH. SOUTH DEVON AND EAST CORNWALL HOSPITAL.

SENIOR HOUSE OFFICER in Surgery, Devonport Section, vacant 21st August, 1955. Recognised for the F.R.C.S.

SENIOR HOUSE OFFICER to Casualty and Traumatic Department, Freedom Fields Section, vacant 3rd August, 1955.

HOUSE OFFICER in Obstetrics, Alexandra Maternity Home, Devonport, vacant immediately.

Applications, stating age, nationality, qualifications and experience, with names of 3 referees, to be sent to—

ARTHUR R. CASH, Group Secretary, Plymouth,
South Devon and East Cornwall General Hospital Group.
7, Nelson-gardens, Stoke, Plymouth.

PONTYPRIDD (near). EAST GLAMORGAN HOS-PITAL, CHURCH VILLAGE. (316 Beds and large Outpatient Department—serving population of 174,000.) PONTYPRIDD AND RHONDDA HOSPITAL MANAGEMENT COMMITTEE. SENIOR HOUSE OFFICER (pathology) to commence 1st October, 1955. The post is partly clinical and partly laboratory. Previous experience in pathology not essential.

Applications, stating age, qualifications and experience, together with copies of 2 recent testimonials, to be sent to the Group Secretary, Courthouse-street, Pontypridd.

PORTSMOUTH GROUP HOSPITAL MANAGEMENT COMMITTEE.

Royal Portsmouth Hospital (104 orthopædic, 70 surgical and 65 medical beds)

SENIOR HOUSE OFFICER (orthopædic), vacant 31st August.

HOUSE OFFICER (orthopædic), vacant 31st August. Pre-registration post.

Applications, stating age, experience and qualifications, together with names of 2 referees, should be forwarded as soon as possible to L. C. ROGERS.

35, Grove-road South, Southsea.

PORTSMOUTH GROUP HOSPITAL MANAGEMENT COMMITTEE.

Queen Alexandra Hospital

SENIOR HOUSE OFFICER required for the Gynæcological Department of the Group for duties at the above Hospital. 40 gynæcological beds. Recognised for M.R.C.O.G. Vacant now.

Applications, stating age, experience, and qualifications, together with names of 2 referees, should be forwarded as soon as possible to L. C. ROGERS.

35, Grove-road South, Southsea.

ROCHFORD, ESSEX. GENERAL HOSPITAL. (603 Beds.) Applications are invited for the appointment of RESIDENT SENIOR HOUSE OFFICER (surgery), at the above modern General Hospital. Post recognised for the F.R.C.S. and vacant mid-August, 1955.

Applications, stating age, &c., to reach the undersigned by 10th August, 1955. J. C. FIELD, Secretary.

READING. ROYAL BERKSHIRE HOSPITAL. (405 Beds.) Applications are invited from registered and provisionally registered medical practitioners, Male or Female, for the resident post of JUNIOR HOUSE SURGEON (E.N.T.), vacant 21st August, 1955. Salary £475–£575 p.a., less £125 p.a., board-residence, &c.

Write, stating age, qualifications with dates, nationality, with copy of 1 recent testimonial, to Secretary, Royal Berkshire Hospital, Reading.

READING. BATTLE HOSPITAL. (374 Beds.) Applications are invited from registered and provisionally registered medical practitioners for post of RESIDENT JUNIOR HOUSE SURGEON in the Area Accident and Orthopædic Department, vacant 1st August, 1955. F.R.C.S. recognised. Also casualty duties. Salary £425–£525 p.a., less £125 board-residence.

Apply, stating age, qualifications with dates, nationality, present position, with copy of 1 recent testimonial, to Hospital Secretary.

ROMFORD, ESSEX. OLDCHURCH HOSPITAL. (722 Beds.) ORTHOPÆDIC HOUSE SURGEON (resident) required in the Orthopædic and Accident Unit from 8th August, 1955. The service consists of 100 Beds equally divided between traumatic surgery and "cold" orthopædics. Post is recognised for pre-registration purposes and for F.R.C.S.

Applications to be sent to Group Secretary, Romford Hospital Management Committee, Oldchurch Hospital, as soon as possible.

ROMFORD, ESSEX. OLDCHURCH HOSPITAL. (722 Beds.) RESIDENT HOUSE SURGEONS (2) required from 15th and 23rd August, 1955, in the General Surgical Unit at the above Hospital. Recognised for F.R.C.S. Open to either pre-registration applicants or to fully qualified practitioners. This very active General Surgical Unit of approximately 100 Beds affords ample opportunities for candidates to obtain first-class tuition and experience.

Applications should be forwarded immediately to Group Secretary, Romford Group Hospital Management Committee, Oldchurch Hospital, Romford.

ROMFORD, ESSEX. RUSH GREEN HOSPITAL. (301 Beds.) RESIDENT HOUSE OFFICER (general surgery) required from 14th August, 1955. Post is recognised for pre-registration purposes and for F.R.C.S.

Applications should be forwarded immediately to Medical Superintendent stating also names of 2 referees.

RUGBY. HOSPITAL OF ST. CROSS, AND ST. MARY'S HOSPITAL, HARBOROUGH MAGNA. HOUSE OFFICER (gynæcology and obstetrics). Obstetrics 40 Beds. Gynæcology 12 Beds. Not pre-registration. Resident.

Applications to Hospital Secretary, Hospital of St. Cross, Rugby.

SALISBURY GENERAL HOSPITAL. Salisbury Group HOSPITAL MANAGEMENT COMMITTEE. Applications are invited for the appointment of SENIOR HOUSE OFFICER to the E.N.T. Department. Post is recognised for D.L.O. and F.R.C.S. and is vacant September, 1955.

Applications, naming 2 referees, to Group Secretary, Odstock Hospital, Salisbury, Wilts.

SCOTTISH NATIONAL BLOOD TRANSFUSION ASSOCIATION. ASSISTANT MEDICAL OFFICER. Applications are invited for this post in the Western Regional Blood Transfusion Service with headquarters in Glasgow. In addition to the collection of blood from donors the post offers excellent laboratory experience in blood-group serology. Salary: £775–£1075 p.a. National Health Service (Scotland) superannuation regulations.

Apply in writing to Regional Director, Blood Transfusion Service, 15, North Portland-street, Glasgow, C.1.

SCOTLAND. NORTHERN REGIONAL HOSPITAL BOARD. Applications are invited for a whole-time post of MEDICAL REGISTRAR at the Inverness Hospitals. Main duties are at the Royal Northern Infirmary.

A form of application and further particulars are obtainable from the undersigned, to whom applications should be submitted by 20th August, 1955. A. M. FRASER, M.D.,
Secretary and Administrative Medical Officer.

Office of the Northern Regional Hospital Board,
Raigmore, Inverness.

SCOTLAND. NORTHERN REGIONAL HOSPITAL BOARD. Applications are invited for a post of SENIOR HOUSE OFFICER in Psychiatry at Craig Dunain Hospital, Inverness (930 Beds).

Applications, on forms obtainable from the undersigned, should be submitted by 20th August, 1955.
A. M. FRASER, M.D.,
Secretary and Administrative Medical Officer.

Office of the Northern Regional Hospital Board,
Raigmore, Inverness.

SCOTLAND. SOUTH-EASTERN REGIONAL HOSPITAL BOARD. Applications are invited for the appointment of REGISTRAR in Obstetrics and Gynæcology in the Edinburgh Northern Group of hospitals, as from 1st October, 1955.

Applications, giving particulars of age, previous experience and qualifications, together with the names of 2 referees, should be submitted to the Secretary, South-Eastern Regional Hospital Board, Scotland, 11, Drumsheugh-gardens, Edinburgh, 3, by 20th August, 1955.

SHEFFIELD. CITY GENERAL HOSPITAL. Applications are invited for the resident appointment of HOUSE SURGEON (general surgery), pre-registration post, vacant on 21st September, 1955. Recognised for F.R.C.S.

Apply, giving full details of age, nationality, qualifications, present and previous appointments (if any) and the names of 2 persons for reference, to the undersigned at Nether Edge Hospital, Sheffield, 11. W. STANSFIELD, Secretary.

SHEFFIELD REGIONAL HOSPITAL BOARD. Whole-time SENIOR ORTHOPÆDIC REGISTRAR (transitional appointment) required for 1 year in first instance at the Doncaster Royal Infirmary. Applications invited from Senior Orthopædic Registrars in their fourth or subsequent years and from those who held such posts for 3 years or more but vacated them after 1st January, 1951.

Applications, giving age, nationality, qualifications, present and previous appointments with dates, naming 3 referees, should be sent to the Secretary, Sheffield Regional Hospital Board, Old Fulwood-road, Sheffield, to arrive not later than 15th August, 1955.

SHEFFIELD REGIONAL HOSPITAL BOARD. Sheffield NATIONAL CENTRE FOR RADIOTHERAPY. Whole-time NON-RESIDENT SENIOR REGISTRAR required. Candidates should possess the Diploma in Radiotherapy or a higher qualification in medicine or surgery. Duties mainly in Sheffield but there may be occasional duties at associated centres in the Region. Appointment for 1 year in first instance reviewable annually.

Apply to Secretary, Sheffield Regional Hospital Board, Old Fulwood-road, Sheffield, by 8th August, 1955, giving age, nationality, qualifications, present and previous appointments with dates, naming 3 referees.

SHEFFIELD REGIONAL HOSPITAL BOARD. Locum REGISTRAR (obstetrics) required at Nether Edge Hospital, Sheffield, for August and September. Single accommodation available. Remuneration £17 10s. per week.

Apply Secretary, Sheffield Regional Hospital Board, Old Fulwood-road, Sheffield, naming 2 referees.

SHEFFIELD. THE UNITED SHEFFIELD HOSPITALS. Applications are invited for the following posts at the Jessop Hospital for Women Unit:—

(*a*) SENIOR REGISTRAR in Obstetrics and Gynæcology, resident or non-resident. Post vacant 14th September, 1955. The appointment is for 1 year in the first instance and will be reviewed annually. It has been agreed in principle between the Board of Governors of The United Sheffield Hospitals and the Sheffield Regional Hospital Board that the appointment, if extended to the full period of 4 years, will be divided, subject to satisfactory work and progress, between the Jessop Hospital and a hospital in the Region.

Applications, stating age, qualifications and experience with the names of 3 referees, should be sent not later than 15th August, 1955, to the Chief Administrative Officer, The United Sheffield Hospitals, West-street, Sheffield, 1.

(*b*) Resident post of SENIOR HOUSE OFFICER (obstetrics). Post vacant 1st October, 1955.

Applications, stating age, qualifications and experience, together with 3 recent testimonials, should be forwarded immediately to the Superintendent, Jessop Hospital for Women, Leavygreave-road, Sheffield, 3.

SOUTHAMPTON. ROYAL SOUTH HANTS HOSPITAL. (278 Beds.) CASUALTY OFFICER (Senior House Officer), orthopædic, required for the above Hospital (Orthopædic Unit 74 Beds) in August. This Hospital is the centre to which all trauma from a large industrial town and port is directed, thus providing excellent experience in the treatment of traumatic conditions.

Applications, with copies of testimonials, to be submitted as soon as possible to the Secretary, Southampton Group Hospital Management Committee, Bullar-street, Southampton.

SOUTHAMPTON. ROYAL SOUTH HANTS HOSPITAL. (278 Beds.) ORTHOPÆDIC HOUSE SURGEON required. Post recognised for Pre-registration Service and tenable for 6 months. This Hospital is the centre to which all trauma from a large industrial town and port is directed, thus providing excellent experience in the treatment of traumatic conditions; patients with orthopædic conditions are also drawn from a wide area.

Applications, with copies of testimonials, should be sent as soon as possible, to the Group Secretary, Southampton Group Hospital Management Committee, Bullar-street, Southampton.

SOUTHAMPTON. ROYAL SOUTH HANTS HOSPITAL. (278 Beds. Recognised for F.R.C.S.) RESIDENT HOUSE SURGEON required immediately. Pre-registration candidates eligible.

Applications, with copies of testimonials, should be forwarded to the Secretary, Southampton Group Hospital Management Committee, Bullar-street, Southampton.

STOCKPORT INFIRMARY. (162 Beds.) Stockport and BUXTON HOSPITAL MANAGEMENT COMMITTEE. Applications are invited for the pre-registration post of HOUSE OFFICER (general surgery and ophthalmology). Recognised for the F.R.C.S. and D.O.M.S.

Applications, stating age, qualifications and experience, together with copies of 2 testimonials, to be addressed to the Group Secretary, 59B, Shaw-heath, Stockport.

STOCKPORT. STEPPING HILL HOSPITAL. (496 Beds.) Applications are invited for the post of SENIOR HOUSE OFFICER (obstetrics and gynæcology), vacant 1st October, 1955. The post is recognised for D.Obst.R.C.O.G., and there are 68 obstetric and 36 gynæcological beds.

Applications, stating age, experience and qualifications, together with the names of 2 referees, to be addressed to the Group Secretary, Stockport and Buxton Hospital Management Committee, 59B, Shaw-heath, Stockport, within 7 days of the appearance of this advertisement.

STOKE-ON-TRENT. CITY GENERAL HOSPITAL. HOUSE OFFICER (general surgery) required, vacant now. Recognised F.R.C.S. examination, and pre-registration.

Applications to Group Secretary, Hospital Management Committee, Princes-road, Stoke-on-Trent.

STOKE-ON-TRENT. NORTH STAFFORDSHIRE ROYAL INFIRMARY. SENIOR HOUSE OFFICER (anæsthetics) required; recognised D.A.—recognition F.F.A.R.C.S. applied for. Previous anæsthetic experience desirable but not essential.

Detailed applications to Hospital Management Committee Secretary, Princes-road, Stoke-on-Trent.

STOKE-ON-TRENT. NORTH STAFFORDSHIRE ROYAL INFIRMARY. (455 Beds.) SENIOR HOUSE OFFICER (ophthalmology) required. Recognised F.R.C.S. and D.O.

Applications to Group Secretary, Hospital Management Committee, Princes-road, Stoke-on-Trent.

STOKE-ON-TRENT. NORTH STAFFORDSHIRE ROYAL INFIRMARY. (455 Beds.) HOUSE OFFICER (general surgery) required. Recognised F.R.C.S. and pre-registration.

Applications to Group Secretary, Hospital Management Committee, Princes-road, Stoke-on-Trent.

STOKE-ON-TRENT. NORTH STAFFORDSHIRE ROYAL INFIRMARY. (455 Beds.) SENIOR HOUSE OFFICER (E.N.T.) required. Recognised F.R.C.S.

Applications to Group Secretary, Hospital Management Committee, Princes-road, Stoke-on-Trent, as soon as possible.

STOKE-ON-TRENT. NORTH STAFFORDSHIRE ROYAL INFIRMARY. HOUSE OFFICER (medical with dermatology) required. Pre-registration post, vacant very shortly.

Apply Secretary Hospital Management Committee, Princes-road, Stoke-on-Trent.

SKIPTON (near). THE HOSPITAL, Grassington, near SKIPTON. Applications invited for RESIDENT MEDICAL OFFICER at the Hospital, Grassington, near Skipton. Appointment is that of Senior House Officer or Junior Hospital Medical Officer, according to experience. The Hospital caters for tuberculous patients, men and women.

Apply to Medical Superintendent.

SOUTH EAST METROPOLITAN REGIONAL HOSPITAL BOARD. Applications are invited for a whole-time appointment as RESIDENT SURGICAL OFFICER to fill a vacancy in the approved establishment at the Dartford Group of hospitals, as from 1st October, 1955. Duties will be mainly at Joyce Green Hospital, Dartford, and also at West Hill Hospital, Dartford, Kent. The salary will be £965 p.a. and the appointment will be in accordance with the terms and conditions of service of hospital medical and dental staffs (England and Wales), and will be for 1 year in the first instance, renewable for a further year.

Applications, giving particulars of age, qualifications and experience with relevant dates, together with the names and addresses of 2 referees, to be sent to the Secretary, Registrars Committee, South East Metropolitan Regional Hospital Board, 11, Portland-place, London, W.1, not later than 13th August, 1955.

SWANSEA HOSPITAL, Swansea. (407 Beds.) Glantawe HOSPITAL MANAGEMENT COMMITTEE. Registered medical practitioners are invited to apply for the resident appointment of SENIOR HOUSE OFFICER in the Traumatic and Orthopædic Department of the above Hospital. Vacancy approximately 1st September. The post is recognised under the F.R.C.S. regulations for 6 months casualty training.

Applications, stating age and experience, together with copies of 2 recent testimonials, should be forwarded to the Hospital Secretary.

SWANSEA HOSPITAL, Swansea. (407 Beds.) Glantawe HOSPITAL MANAGEMENT COMMITTEE. Applications are invited for the post of HOUSE SURGEON (recognised for Pre-registration Service) at the above Hospital. Vacancy 1st August.

Applications, with full particulars, should be addressed to the Hospital Secretary.

TAUNTON HOSPITAL MANAGEMENT COMMITTEE. TAUNTON AND SOMERSET HOSPITAL. Applications are invited for SENIOR HOUSE OFFICER (Resident Surgical Officer). Post vacant now. This is a post giving excellent experience in surgery including operating work according to qualifications and experience. The post is recognised by The Royal College of Surgeons as a qualifying appointment for the Final Fellowship examination.

Applications, stating age, nationality and qualifications, together with the names of 2 referees, should be forwarded to the Group Secretary, Taunton and Somerset Hospital, Musgrove Park Branch, Taunton, Somerset.

WAKEFIELD. PINDERFIELDS GENERAL HOSPITAL. Applications invited for position of SENIOR HOUSE OFFICER or Locum Tenens SENIOR HOUSE OFFICER in the Orthopædic Surgery Department. Salary for Senior House Officer £745 p.a. For the Locum Tenens appointment £14 10s. a week. A charge of £155 p.a. will be made for accommodation.

Address written applications, giving full personal particulars, details of experience, &c., together with 2 names and addresses for reference, to W. BOWRING, Group Secretary.

Victoria Chambers, Wood-street, Wakefield.

WAKEFIELD. PINDERFIELDS GENERAL HOSPITAL. Applications invited for position of SENIOR HOUSE OFFICER or Locum Tenens SENIOR HOUSE OFFICER in the Thoracic Surgery Department. Salary for Senior House Officer £745 p.a. For the Locum Tenens appointment £14 10s. a week. A charge of £155 p.a. will be made for accommodation.

Address written applications, giving full personal particulars, details of experience, &c., together with 2 names and addresses for reference, to W. BOWRING, Group Secretary.

Victoria Chambers, Wood-street, Wakefield.

WATFORD MATERNITY HOSPITAL, King-street, WATFORD. (58 Beds.) Applications are invited for the resident post of JUNIOR OBSTETRICS OFFICER for duties commencing 17th September. Salary £425–£525 p.a. according to experience, less £125 p.a. for residential emoluments. Hospital recognised for M.R.C.O.G. examination.

Applications, giving full details of age, nationality, qualifications, present and previous appointments with dates, and copies of 3 testimonials, should be sent to the Hospital Secretary not later than 10th August, 1955.

WARRINGTON GENERAL HOSPITAL. Applications are invited for the post of RESIDENT SENIOR HOUSE OFFICER (Male or Female) Obstetrics and Gynæcology, which will become vacant on 1st October, 1955. This post is recognised for the D.Obst.R.C.O.G. Scale of salary £745 p.a., less £130 for residential emoluments.

Applications, stating age, qualifications with dates, and details of experience, together with copies of recent testimonials, should be sent to the Group Secretary, Warrington and District Hospital Management Committee, c/o General Hospital, Warrington, Lancs.

WOLVERHAMPTON. ROYAL HOSPITAL. Resident PATHOLOGIST (Junior Hospital Medical Officer) required. Post vacant 31st August. Applicants may visit the Hospital.

Apply to Secretary.

WOLVERHAMPTON GROUP.

The Royal Hospital (an Associated Hospital of the University of Birmingham Medical School)

HOUSE SURGEON with some casualty duties, vacant now. Approved for Pre-registration Service.

HOUSE OFFICER (E.N.T. Department), vacant now.

Apply, with copies of testimonials, to Secretary, The Royal Hospital, Wolverhampton.

WELSH REGIONAL HOSPITAL BOARD.

REGISTRAR in Dermatology. Based at St. David's Hospital, Cardiff, will assist in the Region and in Regional Skin Clinics and will also be expected to undertake duties in the Department of Dermatology at the United Cardiff Hospitals. Non-resident.

REGISTRAR in Psychiatry, Whitchurch Hospital, Cardiff (800 Beds).

REGISTRAR (general surgery) to serve Caernarvon and Anglesey Hospital Management Committee. Based at Llandudno General Hospital. Hospital recognised for F.R.C.S. Non-resident.

SENIOR REGISTRAR in Orthopædic Surgery, Morriston Hospital, Morriston, near Swansea (501 Beds). Non-resident.

Subject to review end of first year.

Application forms from Senior Administrative Medical Officer, Temple of Peace, Cathays Park, Cardiff, within 14 days.

WEST DORSET GROUP HOSPITAL MANAGEMENT COMMITTEE. SOUTH WEST METROPOLITAN REGIONAL HOSPITAL BOARD. PATHOLOGICAL REGISTRAR (preferably resident) required 1st November, 1955. General laboratory and emergency duties, with training in all branches. Some laboratory experience essential. Salary on Registrar grade, less £160 p.a. if resident. Candidates may visit the Laboratory by appointment.

Application form from Group Secretary, West Dorset Hospital Management Committee, Damers-road, Dorchester, Dorset.

WHITEHAVEN HOSPITAL, Cumberland. (124 Beds, plus 27 Beds in Annexe.) HOUSE SURGEON, with orthopædic and casualty duties. (Recognised pre-registration, Senior House Officer grade if appropriate.) Vacant now. Furnished married quarters will be available.

Detailed applications, with dates and copies of 2 testimonials, to Group Secretary, Workington Infirmary, Cumberland.

WINCHESTER. ROYAL HAMPSHIRE COUNTY HOSPITAL. (311 Beds.) SENIOR HOUSE OFFICER (orthopædics) required. Post recognised F.R.C.S. Wide experience available under Area Orthopædic team. Appointment for 6 months in first instance. Vacant 8th September.

Applications, with copies of 2 testimonials, to the Secretary.

WINCHESTER. ROYAL HAMPSHIRE COUNTY HOSPITAL. (311 Beds.) HOUSE OFFICER (anæsthetics). Post vacant 15th August. The Hospital is recognised for the F.F.A.R.C.S. and D.A.

Applications, with copies of 2 testimonials, to the Secretary.

WINDSOR. KING EDWARD VII HOSPITAL. House SURGEON in General Surgery required, Male or Female. Post recognised for F.R.C.S. Preference given to persons seeking pre-registration post. Applicants required to be members of a Medical Protection Society.

Applications, stating age, nationality, qualifications with dates, and copies of recent testimonials, to Hospital Secretary.

WOKING. ROWLEY BRISTOW ORTHOPÆDIC HOSPITAL, PYRFORD, WOKING, SURREY. (200 Beds.) Applications are invited for the posts of 2 RESIDENT HOUSE SURGEONS (Senior House Officer grade), vacant from 29th August. These posts are recognised for the F.R.C.S. examination and will include 1 session per week at St. Thomas's Hospital, London.

Applications should reach the Secretary within 14 days of the date of this advertisement.

WORTHING GROUP HOSPITAL MANAGEMENT COMMITTEE. Applications are invited for the post of Whole-time REGISTRAR in Chest Diseases which becomes vacant early September. Duties at Worthing, Southlands, and Horsham Hospitals (3 general hospitals) and Swandean Hospital, Worthing (T.B.). Previous chest experience necessary. Car essential.

Forms of application are available from the undersigned.

A. V. OAKTON, Group Secretary.

129, Brighton-road, Worthing, Sussex.

WREXHAM. MAELOR GENERAL HOSPITAL. (591 Beds.) Applications are invited for the post of HOUSE SURGEON at the above Hospital, to commence duties at the beginning of August. The appointment is recognised for the Diploma of F.R.C.S. (Eng. and Edin.) and is a pre-registration post.

Applications, stating age, nationality, qualifications and experience, with copies of 2 recent testimonials, to be sent to the Group Secretary, Maelor General Hospital, Wrexham, as soon as possible.

YORKSHIRE. EAST RIDING HOSPITAL MANAGEMENT COMMITTEE.

Westwood Hospital, Beverley, Yorkshire (220 Beds) ORTHOPÆDIC HOUSE SURGEON (first, second, or third post). Offers good opportunity for general experience in busy acute general hospital. Approved pre-registration post. Fully qualified practitioners may apply. Recognised for F.R.C.S.

Apply to Group Secretary.

CHANNEL ISLANDS, JERSEY. GENERAL HOSPITAL. Applications are invited for the post of CASUALTY OFFICER which will be vacant on 1st August, 1955, in the above Hospital. The appointment is for 6 months, but is renewable for a further 6 months. Salary £575 p.a., less £125 for residential emoluments.

Applications to be submitted not later than 6th August, 1955, to the President, Public Health Committee, General Hospital, Jersey, C.I.

MICHIGAN, U.S.A. OAKWOOD HOSPITAL, Dearborn, MICHIGAN. Applications are invited for 1 or 2 year General Practice RESIDENCY in new 230-Bed general hospital 10 miles from Detroit. Excellent facilities. Hospital approved for exchange-visitor programme. Salary begins at $275 per month.

Apply: Director.

B.W.I. UNIVERSITY COLLEGE HOSPITAL OF THE WEST INDIES. Applications are invited for the post of REGISTRAR in the Division of Medicine at the above-named Teaching Hospital which is in special relationship with the University of London. Higher qualifications desirable but not essential. The successful candidate will be required to be in Jamaica as early as possible after appointment. The appointment will be for 1 year in the first instance, subject to renewal. Salary is payable within the scale £800–£100–£1000/£1100–£100–£1400 p.a., depending on experience and qualifications. Single accommodation and board, or a limited number of unfurnished flats for unmarried or married officers, are provided at a deduction of £125 p.a. or 5% of salary, respectively. Return first-class passage by sea will be paid for 1 person only.

Further information may be obtained from the Hospital Manager and Secretary, University College Hospital, Mona P.O., Jamaica, B.W.I., to whom applications, stating age, nationality and details of qualifications and experience, together with 3 recent testimonials or the names and addresses of 3 referees, should be sent by 20th August, 1955.

B.W.I. UNIVERSITY COLLEGE HOSPITAL OF THE WEST INDIES. Applications are invited for the post of REGISTRAR in the Department of Anæsthetics at the above-named teaching hospital which is in special relationship with the University of London. Higher qualifications desirable, but not essential. Successful candidates will be required to be in Jamaica by the end of September, 1955. The appointment will be for 1 year in the first instance, subject to renewal. Salary is payable within the scale £800–£100–£1000 £1100–£100–£1400 p.a., depending on experience and qualifications. Single accommodation and board, or a limited number of unfurnished flats for unmarried or married officers, are provided at a deduction of £125 p.a. or 5% of salary, respectively. Return first-class passage by sea will be paid for 1 person only.

Further information may be obtained from the Hospital Manager and Secretary, University College Hospital, Mona P.O., Jamaica, B.W.I., to whom applications, stating age, nationality and details of qualifications and experience, together with 3 recent testimonials or names and addresses of 3 referees, should be sent by 1st September, 1955.

IBADAN, NIGERIA. UNIVERSITY COLLEGE HOSPITAL. The Board of Management invites application for the appointments of SENIOR REGISTRAR and REGISTRAR (Department of Surgery). Candidates must be fully registered by the General Medical Council and for the Senior appointment must hold a higher qualification.

Salaries :

Senior Registrar : first tour, £1308 p.a. ; second tour, £1356 p.a. ; third tour, £1404 p.a. ; fourth tour, £1452 p.a. Plus expatriation pay of £300 p.a. where applicable.

Registrar : first year, £1020 p.a. ; second year, £1068 p.a. Plus expatriation pay of £240 p.a. where applicable.

Gratuities. On satisfactory completion of agreement, a gratuity of £25 (or £37 10s. on salaries over £1000) will be paid for each completed quarter of service.

Duration of appointments :

Senior Registrars : 1 tour of 1 year in the first instance renewable by mutual agreement up to a total of 4 tours.

Registrars : 1 tour of 1 year in the first instance renewable by mutual agreement for a further tour of 1 year.

Outfit allowance : £60 payable on first appointment.

Quarters : partly furnished quarters are provided at a rental of 10% of salary, excluding expatriation pay.

Leave : expatriate Officers will be eligible for 7 days leave on full pay for each completed month of service in Nigeria.

Passages : free first-class passages to and from Nigeria are provided for expatriate Officers and their wives.

Children's allowances : Officers will be eligible for children's allowances.

Applications should be submitted not later than 8th August on the appropriate form, which can be obtained with further particulars on receipt of an addressed foolscap envelope, from the Adviser on Staff Recruitment, London Office, University College Hospital, Ibadan, 57, Catherine-place, London, S.W.1.

Public Appointments

CROYDON. COUNTY BOROUGH OF CROYDON. ASSISTANT MEDICAL OFFICER OF HEALTH AND SCHOOL MEDICAL OFFICER. Applications are invited for this established appointment from registered medical practitioners, with at least 3 years experience after qualification, for duties mainly in the School Health and Maternity and Child Welfare Service. The possession of the D.P.H. or D.C.H. will be an advantage. Salary within the scale £975–£50–£1375 p.a.

Application forms obtainable from the Medical Officer of Health, 45, Wellesley-road, Croydon. Closing date 22nd August.

E. TABERNER, Town Clerk.

FIFE COUNTY COUNCIL. Health and Welfare Department. Applications are invited from duly qualified medical practitioners who possess a Diploma in Public Health, for appointment as Whole-time SENIOR ASSISTANT MEDICAL OFFICER OF HEALTH. The duties will be concerned with general public health activities and administration as may be decided from time to time by the County Medical Officer. The post is superannuable and the successful candidate will require to pass a medical examination. Travelling and subsistence allowances will be paid in accordance with the Council's scale. Salary grade £1050 rising by annual increments of £50 to a maximum of £1400 p.a. Placing according to experience.

Applications, giving full particulars of experience and qualifications and accompanied by copies of 3 recent testimonials or the names and addresses of 3 referees, should be lodged with the County Medical Officer, County Buildings, Cupar, Fife, not later than 14 days from the appearance of this advertisement. No canvassing.

MATTHEW POLLOCK, County Clerk.

County Buildings, Cupar, Fife.

BAHRAIN, PERSIAN GULF. GOVERNMENT OF BAHRAIN MEDICAL DEPARTMENT invites applications from British Male Doctors for the post of OPHTHALMOLOGIST-REFRACTIONIST for Medical Officer. Age 28–40. Minimum salary £1694, rising £45 annually, no allowances. Non-contributory gratuity on retirement. Private Practice among Europeans only. No income-tax. Free quarters with hard furniture and car. Agreement for 2 years, renewable, with 5 months home leave on full pay and free air passages every 2 years. D.O. required.

Applications, with 3 testimonials and a photograph, should be addressed to Messrs. CHARLES KENDALL & PARTNERS LTD., 7, Albert-court, Kensington Gore, London, S.W.7.

BARROW-IN-FURNESS. COUNTY BOROUGH OF BARROW-IN-FURNESS. Applications are invited from fully qualified and registered medical practitioners for the appointment of ASSISTANT MEDICAL OFFICER OF HEALTH AND SCHOOL MEDICAL OFFICER. Salary is as laid down by the Medical Council of the Whitley Councils for the Health Services (£975 p.a. rising by annual increments of £50 to £1375 p.a.), and the point of entry will be fixed in accordance with the qualifications and experience of the person appointed. The appointment will be subject to the Corporation's general conditions of service and is superannuable. As the duties are mainly in connection with the School Health Service and Maternity and Child Welfare Service, the possession of the D.P.H. or D.C.H. will be an advantage.

Further particulars and application forms may be obtained from the Medical Officer of Health, Town Hall, Barrow-in-Furness. Completed applications must be received by the undersigned not later than NOON on Monday, 15th August, 1955.

LAWRENCE ALLEN, Town Clerk.

Town Hall, Barrow-in-Furness.

EAST HAM. COUNTY BOROUGH OF EAST HAM. DEPUTY MEDICAL OFFICER OF HEALTH AND DEPUTY PRINCIPAL SCHOOL MEDICAL OFFICER. Applicants must be medical practitioners not more than 45 years of age, with a Diploma in Sanitary Science, Public Health or State Medicine, and considerable clinical and administrative experience in public health and school medical work. Salary £1326 13s. 4d.–£51 10s.–£1584 3s. 4d. p.a.

Further particulars and form of application, returnable by 15th August, 1955, from Town Clerk, Town Hall, East Ham, E.6.

NOTTINGHAM. CITY OF NOTTINGHAM HEALTH SERVICES. SENIOR ASSISTANT MEDICAL OFFICER. Applications are invited from Male registered medical practitioners holding a Diploma in Public Health for this appointment. The salary will be within the scale £1075–£50–£1475 a year. The commencing salary to be fixed in accordance with experience. In addition to special duties in connection with health education the successful candidate will be given wide opportunities for administrative and practical experience in all services of the Health Department. The appointment is superannuable and subject to the usual conditions.

Forms of application may be obtained from the undersigned to whom they must be returned, together with the names of 2 referees, by not later than 12th August, 1955.

T. J. OWEN, Town Clerk.

Guildhall, Nottingham, July, 1955.

NATIONAL COAL BOARD. North-Eastern Division. Applications are invited for the post of MEDICAL OFFICER in the Wakefield Area of the North-Eastern Division. Candidates should have experience in the field of preventive and industrial medicine and a knowledge of the coalmining industry will be an advantage. The work will include making underground visits to collieries. Salary, according to qualifications and experience, will be within the range of £1400–£2150 p.a.

Detailed applications, giving the names of 2 referees, should be sent to the Divisional Establishments Officer, National Coal Board, North-Eastern Division, Ranmoor Hall, Belgrave-road, Sheffield, 10, to arrive not later than Monday, 15th August, 1955.

STOKE-ON-TRENT. CITY OF STOKE-ON-TRENT. Applications are invited from registered medical practitioners, holding in addition a Degree in Sanitary Science, Public Health or State Medicine, for the post of DEPUTY MEDICAL OFFICER OF HEALTH for the City of Stoke-on-Trent at a salary of £1600 rising by 2 increments of £100 and 1 increment of £50 to a maximum of £1850. A car allowance will be paid if the Deputy uses his own car on approved duties. A house is available on a service tenancy, if required. The appointment will be subject to the appropriate superannuation Act ; to the successful candidate passing a medical examination, and may be terminated by 3 months notice on either side. The person appointed will be required to devote the whole of his time to the duties of the office, and to act under the direction of the Medical Officer of Health. Applicants should have had considerable experience both in the clinical and administrative aspects of a health department.

Applications, stating age, qualifications and experience and enclosing copies of 3 recent testimonials, should be forwarded to the Medical Officer of Health, Public Health Department, St. Peter's Chambers, Glebe-street, Stoke-on-Trent, not later than 20th August, 1955. HARRY TAYLOR, Town Clerk.

WEST BROMWICH. COUNTY BOROUGH OF WEST BROMWICH. Applications are invited from registered medical practitioners for the appointment of DEPUTY MEDICAL OFFICER OF HEALTH AND DEPUTY PRINCIPAL SCHOOL MEDICAL OFFICER at a salary in accordance with the scale £1222 rising by 5 increments of £51 10s. to £1479 10s. The Council have adopted the conditions of service agreed by the Medical Council of the Whitley Councils for the Health Services.

Full particulars and form of application may be obtained from the undersigned. Closing date for applications 22nd August, 1955.

Town Hall, West Bromwich. J. M. DAY, Town Clerk.

GLOUCESTERSHIRE COUNTY COUNCIL. Applications are invited for the appointment of ASSISTANT COUNTY MEDICAL OFFICER OF HEALTH (Male). Salary in accordance with the Whitley Council for the Health Services; Medical Council, £975 p.a. rising by £50 to £1375 p.a. Commencing salary will be determined on previous experience. Applicants must be registered medical practitioners and possession of a Diploma or Certificate in Public Health would be an advantage. The post is superannuable and is subject to a medical examination. Must be able to drive and possess a motor-car; travelling and subsistence allowances in accordance with the County scale.

Forms of application with particulars of duties and conditions of appointment may be obtained from the County Medical Officer of Health, Berkeley House, Berkeley-street, Gloucester, to whom completed applications should be sent not later than 12th August, 1955.

GUY H. DAVIS, Clerk of the County Council.

Shire Hall, Gloucester.

GOVERNMENT OF BRITISH GUIANA. Medical Superintendent required for the Mental Hospital, Berbice. Under the direction of the Director of Medical Services, he will have charge of Hospital, control of its staff and supervision of its expenditure and revenue. Hospital accommodation is 597 Beds. Superintendent will medically supervise all patients and have whole-time assistance of a Medical Officer, not specially trained in treatment of mental diseases. Superintendent will also be in charge of psychiatric clinic held monthly in Georgetown. Appointment on permanent basis with pension (non-contributory) at age of 55. Doctors in the National Health Service may resign from the National Health Service but retain their superannuation rights during their time overseas (up to 6 years) and receive a resettlement grant (taxable) of 20% of the aggregate of their salary on leaving overseas employment. Salary £1800 p.a. plus non-pensionable allowance of £250 p.a. in lieu of consultation fees. Private practice is not permitted. Pension is earned at the rate of 1/600th of final pensionable emoluments for each completed month of service. Income-tax at local rates. Free unfurnished quarters are provided. Local leave permissible and generous home leave granted after each tour of 2–3 years. On appointment free passages provided for officer, wife, and children under 18 years, not exceeding 5 persons in all. Free passages on leave provided for officer and wife only. Candidates must possess medical qualifications registrable in the United Kingdom, hold a Diploma in Psychological Medicine and have had at least 2 years experience in a mental hospital.

Application forms from Director of Recruitment, Colonial Office, Sanctuary Buildings, Great Smith-street, London, S.W.1 (quoting reference No. BCD.117/30/05).

POOLE. BOROUGH AND COUNTY OF THE TOWN OF POOLE. COUNTY OF DORSET. Joint Appointment. Borough: Deputy Medical Officer of Health. County: Assistant Medical Officer. Applications are invited from registered medical practitioners holding the Diploma in Public Health for full-time service in the joint appointment of DEPUTY MEDICAL OFFICER OF HEALTH for the Borough of Poole AND DEPUTY PORT MEDICAL OFFICER (4/11), SCHOOL MEDICAL OFFICER, Poole excepted District (3/11), AND ASSISTANT COUNTY MEDICAL OFFICER (4/11). Salary: minimum £1195 5s. 8d.; maximum £1579 16s. 7d. Car allowance.

Full particulars and forms of application may be obtained from the Town Clerk, Poole, Dorset. Closing date 8th August, 1955.

WILSON KENYON, Town Clerk, Poole.

C. P. BRUTTON, Clerk of the County Council, Dorchester.

AMENDED ADVERTISEMENT

RHONDDA BOROUGH COUNCIL AND GLAMORGAN COUNTY COUNCIL. Mixed appointment of DEPUTY MEDICAL OFFICER OF HEALTH AND ASSISTANT SCHOOL MEDICAL OFFICER. Applications are invited from suitably qualified persons under the age of 50 years for the pensionable mixed appointment as above, at an aggregate salary under Awards Nos. 2285, 2321, and 2565 of the Tribunal of £1174 7s. rising to £1562 15s. 2d. p.a.

Form of application and particulars of appointment from the undersigned. Closing date 8th August, 1955, at NOON.

D. J. JONES, Town Clerk.

The Municipal Offices, Pentre, Rhondda, 18th July, 1955.

ROYAL ARMY MEDICAL CORPS. New Conditions and Terms of Service. Regular and Short-service Commissions. New and improved conditions of service in the R.A.M.C. are now offered to Medical Practitioners. These include:—

Permanent commissions direct from civil life.

After 1 years satisfactory service, grant of £1500 (taxable) to officers appointed to a regular commission after 1st October, 1953.

Antedates (which count towards pay and promotion) of up to 7 years for civilian experience, and credit for former commissioned service as a medical or combatant officer in any of the 3 services.

A 3-year Short-service Commission offers an alternative to National Service with higher rates of pay and allowances and eligibility for married quarters.

Increases in pay for Captains and above.

Increased rates of specialist pay.

A limited number of vacancies exist for experienced specialists of the Consultant or Senior Registrar grade.

Excellent facilities are offered for training selected young medical officers as specialists. Approximately 1 Medical Officer in 3 will be selected for specialist training.

For full details application should be made to the Assistant Director-General, A.M.D.2, The War Office, London, S.W.1. Telephone inquiries should be made to the Staff Captain, J. A. WALE, M.B.E., No. GROsvenor 8040, Ext. 548.

General Practice

For an Executive Council post (England and Wales) apply on form E.C.16A obtainable from the council. Mark envelope "Vacancy."

BRADFORD, YORKSHIRE. Applications invited for VACANCY (urban district). List at present approximately 1245. Surgery accommodation available but not residence. Apply on E.C.16A before 13th August, 1955, to—

S. G. HEMMS, A.C.I.I., Clerk, Bradford Executive Council.

Bank House, 30A, Manor-row, Bradford, 1, Yorks.

BIGGIN HILL, KENT. Applications invited for Vacancy (chiefly urban). List at present approximately 2970 including approximately 470 patients who reside in the County of Surrey. Surgery accommodation available immediately; residence later. The practice has been in the hands of a lady doctor for 30 years but more than one third of the patients are male. Apply on E.C.16A before 13th August, 1955, to—

F. E. MILES, Clerk,

Kent and Canterbury Executive Council.

11, Station-road, Maidstone.

NEW ZEALAND. Dermatological Practice. Well-established practice in leading New Zealand City. Great scope for well qualified man.—Details from Medical Practices Advisory Bureau, B.M.A. House, Tavistock-square, London, W.C.1.

Hospital Services: Non-Medical Appointments

EDGWARE GENERAL HOSPITAL, Edgware, Middlesex. (715 Beds.) BIOCHEMIST required at above Hospital. Candidate with 2 years experience preferred but new graduates will be considered. Salary scales: basic grade, £460 p.a.–£25 p.a.–£535 p.a.; after probationary period, £585 p.a.–£30 p.a.–£765 p.a. All salaries subject to increase awaiting confirmation by the Ministry. Commencing salary according to qualifications and experience. London weighting also payable according to age.

Apply immediately, stating age, qualifications and details of experience, together with the names and addresses of 2 referees, to Group Secretary, Edgware General Hospital.

Miscellaneous

To non-professional posts the Notification of Vacancies Order 1952 applies.

AUSTRALIAN RED CROSS SOCIETY. Incorporated by Royal Charter, 1941. (SOUTH AUSTRALIAN DIVISION.) Applications are invited for the position of DIRECTOR of Blood Transfusion Services in Adelaide, South Australia.

General Duties: The Director will be responsible to the Red Cross Divisional Executive by way of the Red Cross Blood Transfusion Sub-Committee. He will have charge of the Red Cross Blood Centre, Adelaide. The Centre contains the Central Donor Services and Laboratories. A Central Reference Laboratory for the State is to be established at once. Facilities for research will be available, including clinical study in hospitals. The Director will act in a consultative and advisory capacity on problems arising in this field throughout the State.

Experience: Applicant must have a Medical degree, and be experienced in advanced blood grouping work in practice and theory. He must be able to direct technical and non-technical staff.

Salary: Commencing salary £2250 (Aus.) with increments annually to a maximum of £2600 for full-time service. Salary will comence from date of departure for Adelaide.

Term of appointment: Appointment will be for 3 years in the first instance, thereafter renewable by mutual agreement.

Applications: Setting out the following information:—

(1) Name in full,
(2) Address,
(3) Date of birth,
(4) Marital status,
(5) Number, age and sex of children, if any,
(6) Academic qualifications,
(7) Experience,
(8) Names of 3 referees from whom confidential inquiries may be made,

and accompanied by a Medical Certificate of Health, and a recent photograph should be submitted as soon as possible to the Agent-General and Trade Commissioner for South Australia, South Australia House, Marble Arch, London, W.1.

Senior E.N.T. Consultant offers another use of consulting-room and equipment 4 days a week.—Address, No. 154, THE LANCET Office, 7, Adam-street, Adelphi, London, W.C.2.

Faradic Cabinet, white/chromium, cupboard underneath, foot bath, as new.—BAL. 6203 mornings.

"Pregnancy Diagnosis by the Xenopus Method," 24-hour service. Send specimen of urine and £1 1s. fee. Hematology, Biochemistry, Flame Photometry.—WELBECK BIOLOGICAL LABORATORIES, 26, Park-crescent, Portland-place, W.1. (MUSeum 5386–7).

Applicants for posts requiring testimonials copied or duplicated should communicate with MANTON SECRETARIAL SERVICE LTD., 98, Victoria-street, S.W.1 (Phone: VICtoria 0141), who are specialists in this kind of work.

Professional, technical and personal typewriting. Duplicating, circularising, &c., efficiently and speedily executed.—"MOWBRAY," 146, Bishopsgate, E.C.2 (BIS. 2545, BAR. 7665).

Typewriting and Duplicating. First-class work at moderate prices by experienced medical typists.—SYBIL RANG, 21, Heath-street, Hampstead, London, N.W.3 (HAM. 5329/0504).

Austin. The New Show Models A.30, A.40, A.50 and A.90. Limited number of orders now acceptable from proven essential users for delivery ahead.—Demonstrations, easy terms, brochures, application forms on request, from H. A. SAUNDERS LIMITED, Austin House, 140–144, Golders Green-road, Golders Green, London, N.W.11.

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SHOCK AFTER BURNS

THIS PATIENT has been badly burned. Plasma is being lost, with a consequent reduction in the colloidal osmotic pressure of the blood.

COLLOID must be infused if blood volume is to be maintained.

A CLEAR CASE FOR DEXTRAVEN, the optimal fraction dextran.

DEXTRAVEN raises the blood pressure swiftly and surely. Loss by renal excretion is minimal and most of what is infused stays in the circulation for at least 24 hours.

DEXTRAVEN can be given immediately by intravenous infusion. Stable indefinitely under all climatic conditions, it requires no special storage precautions.

DEXTRAVEN is approved by the Ministry of Health. Fully descriptive literature is available and a Technical Information Service is always at your disposal.

A clear case for DEXTRAVEN

TRADE MARK

D4. (REV.1)

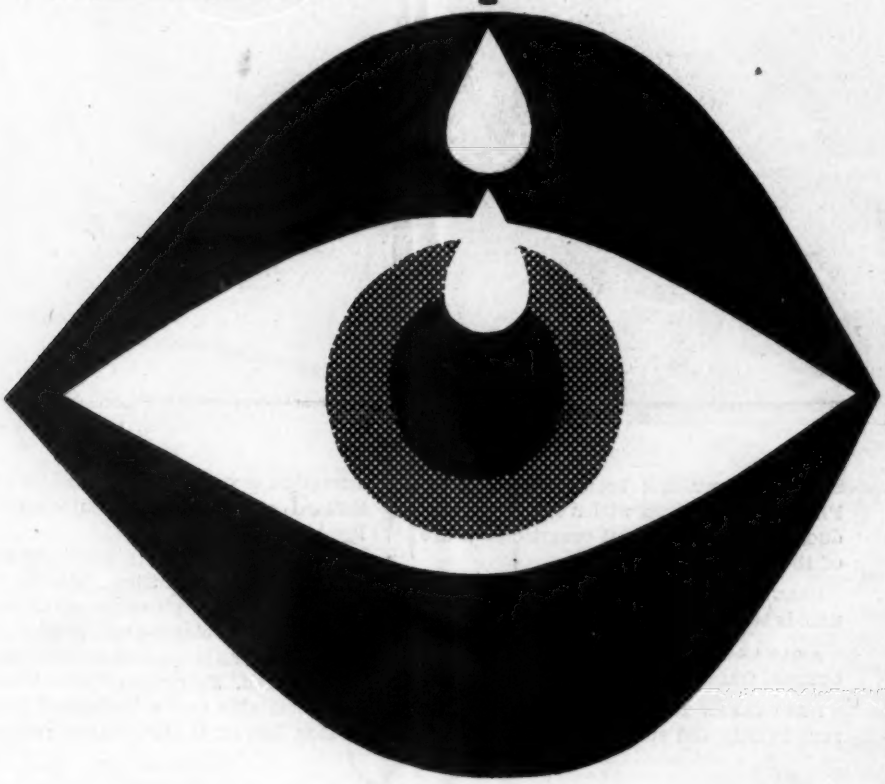
BENGER LABORATORIES LIMITED · HOLMES CHAPEL · CHESHIRE

A BENGER PRODUCT

For infections of the eye . . .

Sulfomyl* fulfils the need for a non-irritant sulphonamide for use in common eye infections. The new preparation is active in the presence of blood, pus and mucus and being virtually non-toxic is especially valuable in cases sensitive to other drugs. Available as eye drops in a simply operated dropper bottle or as ointment.

**(p-sulphonamidobenzylamine propionate)*



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Sulfomyl

eye drops

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